CHOICE OF CASUAL AND REGULAR LABOUR CONTRACTS IN INDIAN AGRICULTURE : A THEORETICAL AND EMPIRICAL ANALYSIS

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Abstract

The dissertation examines the choice between casual and regular labour contracts in Indian agriculture. In particular, it deals with two relevant decision problems : (i) how an employer chooses between casual and regular contracts and (ii) how a labourer chooses between casual and regular contracts.

Several models of contractual choice are developed. In the implicit contract model, regular labour contracts are a means through which risk-neutral employers offer some insurance against the wage and employment fluctuations to labourers, in return for lower wages. In the shirking model, regular contracts are used to perform non-monitorable tasks for which casual contracts are not incentive compatible: regular contracts with wages above the reservation wage act as a device to induce the workers not to shirk in non-monitorable tasks. In the collateral model, regular contracts with advance wage payments provide labourers with a means of using their labour services as a collateral substitute. The time constraint model shows that landless labourers have a comparative advantage in regular labour contracts, because the opportunity cost of precommitting labour time tends to be lower for them. In each of these models, it is shown that casual and regular contracts may coexist in equilibrium.

Empirical evidence bearing on these different theories is examined using data from three South Indian villages. The evidence is consistent with the implicit contract model, the collateral model and the time constraint model. However, we find no support for the shirking model. Other relevant aspects of labour contracts are also investigated, including labour force participation decisions, unemployment rates, the relative levels of casual-labour and regular-labour wages, the links between labour and credit contracts, and the determinants of labour demand.

The thesis concludes with a discussion of recent trends in the incidence of casual and regular contracts in rural India. The incidence of regular contracts has steadily declined in recent years. We argue that this decline primarily reflects a decline in supply (due, inter alia, to an improvement of credit facilities and an expansion of alternative employment opportunities) rather than a decline of demand.

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Table of Contents

CHOICE OF CASUAL AND REGULAR LABOUR CONTRACTS IN INDIAN AGRICULTURE: A THEORETICAL AND EMPIRICAL ANALYSIS

....

List of Tables

Chapter Three :

Chapter Four :

Chapter Five :

Chapter Six :

Chapter Seven :

List of Figures

Chapter Two :

Chapter Three :

Chapter Five :

Chapter Six :

Abbreviations

ha. : Hectare

mm. : Millimetre

ICRISAT : International Crop Research Institute for the Semi-Arid Tropics

JGRCAST : J.G. Ryan caste ranking variable

χ^2 : Chi-Square Statistic

OLS : Ordinary Least Squares

$\hat{L}$: Log-Likelihood Function

LM : Lagrange Multiplier

LR : Likelihood Ratio

MLE : Maximum Likelihood Estimator

DLM : Dual Labour Market Theory

SLM : Segmented Labour Market Theory

NSC : No-Shirking Condition

NSS : National Sample Survey

POL : Probability of Farm Participation

POM : Probability of Casual Farm Participation

PU : Probability of Unemployment

RFS : Regular Farm Servant

Rs. : Rupees

A.P. : Andhra Pradesh

M.P. : Madhya Pradesh

U.P. : Uttar Pradesh

INTRODUCTION

Introduction

This dissertation seeks to examine the choice of contracts in the agricultural labour markets in India.

Agriculture is the single largest source of national income in India. In 1984, 44.8% of gross domestic product came from agriculture. According to the 1981 census, 66.56% of the labour force are engaged in agriculture. A study of the rural labour markets in India, therefore, assumes enormous importance not only to generate an appropriate employment policy, but also to alleviate the persistent problems of inequality and poverty of rural labourers.

Rural labour markets in India are characterized by a variety of ties between employers and labourers. A particular distinction is made between casual and regular labour contracts. Casual labourers are hired for a short period (say, one to three days); payment may be paid on a daily or piece-rate basis. In addition, farmers may often hire some labourers for a longer term: a whole year or a particular crop season of the year. Such labourers are called permanent labourers, regular labourers or attached farm servants. Casual and regular contracts are different not only with respect to the duration of the contract, but also with respect to wage and non-wage benefits. In particular, regular farm servants are usually entitled to some additional facilities like credit, bonus, gifts, homestead land etc. which a casual labourer does not receive.

A number of studies (Bardhan & Rudra, 1981; Rudra, 1982a, 1982b; Bardhan, 1984a; Binswanger et al., 1984; Drèze & Mukherjee, 1987; Walker & Ryan, 1990) have pointed out that farmers hire both casual and regular contracts in different parts of India. A theoretical framework is developed here to analyse the contractual choices of employers as well as labourers. In particular, we consider when and under what circumstances choice of regular contract as opposed to casual contracts is the preferred option, and also why and how the choice of contract may evolve over time.

1. The Background

The analysis of choice of labour contracts may assume significance for the following reasons.

1.1. Labour Utilization in Agriculture

Since the mid-60s, a great deal of attention has been paid to the issue of labour utilization in agriculture in less developed countries. Gradually, it has been recognised that the problem of gross under-utilization of the rural labour force cannot be solved merely by exporting labour to cities and towns by encouraging migration, as has been prescribed by the Lewis model (Lewis, 1954). 'It has been realized that a rapidly expanding rural-urban migration, without being matched by an increasing demand for labour in the organized sector, leads to an unplanned expansion of the already large informal sector in many cities with its resultant social and economic consequences' (Dasgupta, 1977).

As an alternative, one needs to look for other ways of ensuring a fuller use of manpower resources in the rural sector. This has led to a growing interest in micro-level village studies. This is particularly important for a country like India, where 70% of the population lives in villages and where even two neighbouring villages are characterized by a myriad of heterogeneities. An urgent need to alleviate the problems of unemployment and poverty necessitates detailed studies of the functioning of labour markets in rural India.

1.2. Lack of Analysis

Most development models have been dominated by the long-standing debate on surplus labour in agriculture. These models tend to assume the smooth operation of different commodity and factor markets. The central idea of these models is that a rigid, institutionally given wage rate prevails for the homogeneous labour force. Hence, the surplus labour from the rural sector can be drawn into the urban sector, at a constant wage rate, to accelerate the process of development. This overshadows issues like the prevalence of a variety of personal ties between employers and labourers, informational problems, and various kinds of imperfection and market failure in the rural sector of low income countries.

In a complete, competitive market economy, representative farms/employers and employees buy and sell labour as a homogeneous commodity at well-defined prices determined by the market supply and demand. However, in rural labour markets, there are heterogeneous labour contracts and heterogeneous farms, informational problems and uncertainties, conflicting interests among the agents and problems of enforcement, crop failure and seasonality of employment, credit requirements and problems of collateral; hence, markets often fail to clear.

The lack of adequate micro-theoretic development is nowhere so pronounced as in the case of rural labour contracts in agriculture. Contrary to the usual assumption of homogeneity of labour in agriculture, a number of village level studies conducted in different parts of India have repeatedly brought to light the essential heterogeneity of labour arising from a variety of personal ties[1]. Until very recently (Bardhan, 1984a, 1989), questions of contractual choice in the labour market, in general, and the dichotomy between casual and regular labour contracts, in particular, have been ignored in the standard microeconomic development theory. The present study is aimed at contributing to these recent efforts.

1.3. Rural Development Strategies

The empirical component of the study focuses on three villages in India, namely, Aurepalle in the Mahboob Nagar district of Andhra Pradesh, Shirapur in the Sholapur district, and Kanzara in the Akola district of Maharashtra, all situated in the semi-arid tropics (SAT) of India[2]. More than 250 million rural people reside in the SAT area of India and depend heavily on agriculture. Farmers and agricultural labourers constitute about two-thirds of a total of 180 million active workers living in these semi-arid tropical areas. An analysis of labour contracts pertaining to this area assumes a special prominence not only in formulating an employment policy, but also in devising an overall development strategy for the huge mass of poor people residing in this area. In doing so, the analysis is useful in (i) promoting an understanding of the functioning of a village economy as well as its changes over time; (ii) formulation of appropriate economic policies with a view to alleviate inequality and poverty; and (iii) assessment of the impact of any government policy on the cross-section of the landless poor residing in these villages.

[1]This is clearly indicated by Rudra (1982a). He refers to a variety of labour contracts with respect to the duration of contract, mode of payment, medium of payment, degree of attachment etc as prevailing in rural West Bengal.

[2]The data have originally been collected by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) situated in Hyderabad. Basic data have been supplemented by two successive surveys in Aurepalle which are described in chapter three.

2. The Problem

Basant (1984) and Walker and Ryan (1990) report that larger farms/households[3] hire regular farm servants while smaller ones rely on casual labourers. However, given the seasonal fluctuations of agricultural production, there are implicit hoarding costs of employing regular labour as because there may not be enough demand for labour throughout the year. Agarwal (1981) and Reddy (1985) find that in a particular farm (small or large), there are differences in the nature of tasks performed; sometimes, casual and regular contracts can be identified by the nature of tasks.

A majority of these regular farm servants comes from landless families, usually belonging to the lowest caste in the village and without many alternative means of survival (Alexander, 1973; Basant, 1984). Though daily regular wages are lower than daily casual wages (Sanghvi, 1969; Ghose, 1980; Basant, 1984), regular labourers, in most parts of India, unlike casual labourers, receive some additional facilities (credit, bonus/gift) over and above their wage (Alexander, 1973; Bardhan, 1984a; Binswanger et al., 1984; Walker & Ryan, 1990). The nature of these additional facilities is such that these are also difficult to obtain for the landless poor.

Two distinct schools of thought emerge from the existing literature. The bulk of the relevant theoretical literature is developed in the tradition of Segmented Labour Market (SLM) theory[4] to explain the segmentation in the industrial labour market in developed countries. There are also occasional attempts in agrarian contracts theory[5], especially in the 80s, to explain rural contractual arrangements which incorporate various tools of imperfect information theory. We aim to extend the existing literature on choice of rural labour contracts; in doing so, the following arguments are advanced in the dissertation.

(1) If farmers are all risk-neutral and workers risk-averse, farmers may insure a group of labourers against the fluctuations of wage and employment and offer regular contracts. In the process, farmers may persuade that regular labourers to accept a lower wage compared to casual labourers; the wage differential constitutes the premium for the employment insurance in regular contracts.

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[3]The distinction between farms and households in the rural labour market is negligible. There is an interdependence between the operation of farms and households in these economies. Households have two functions. In their ability to organise production, they are called farms while they are called households in their ability to participate in labour market activities. We shall, therefore, use these terms interchangeably.

[4]We refer to Doeringer & Piore (1971), Bulow & Summers (1986), Jones (1987), Weitzman (1989).

[5]We refer to Hallagan (1978), Bardhan (1979, 1983, 1984a), Eswaran & Kotwal (1985a, 1985b) ,Guha (1989), Mukherjee (1991), Mukherjee & Ray (1992), Dasgupta (1993a).

However, given the seasonal idleness of regular labourers, maintaining a fixed pool of regular labourers throughout the year may involve some 'hoarding costs'. Hence, farms may not hire only regular labourers but also some casual labourers. The hoarding cost constraint may be less binding for larger farms because they have more demand for labour than smaller farms during any period in the production cycle; this may induce them to hire some regular labour.

H1. Regular wage per period is less than casual wage per period;
H2. Larger farms tend to employ more regular labourers than smaller farms.

(2) The second argument is a variant of the efficiency wage theory. There are some tasks difficult to supervise and, hence, the employment of casual labourers in these tasks may be inefficient. Thus, farms may offer regular contracts with some incentives to induce labourers not to shirk and perform these non-monitorable tasks. One effective incentive is to pay regular labourers more than reservation wage, inducing them to work hard so as to retain their jobs. Casual labourers may be employed to perform other tasks.

H3. Regular wage per period is greater than workers' reservation wage;
H4. Farms prefer to employ regular labourers to perform non-monitorable tasks.

(3) The third argument differs from the first two in that it focuses on the supply of labour. We consider a segmented credit market where the credit market is divided between the formal and informal sectors. Given this segmentation of the rural credit market, labourers, especially the landless ones, are usually excluded from the formal sector and, therefore, face a higher marginal cost of credit (i,e, discount rate) in the informal sector. In this respect, the provision of interest-free wage advance (i.e., credit) to regular labourers, which is not provided to casual labourers, may play a useful role. For given casual wages, there would exist a regular wage, paid in advance, which is mutually beneficial to the employer and labourers.

H5. If labourers have a higher discount rate than employers, a regular contract with advance wage payment can be beneficial to both employers and labourers.

(4) The fourth argument, too, is viewed from the perspective of labourers. Labourers' family landholding vary in size. According to the size of their landholding, labourers can be divided into 'landed' and 'landless' categories. In the absence of any family obligation to

work on family land, landless labourers can market all their non-leisure time. On the other hand, landed labourers are usually obliged to devote some time to the family farm; hence, their opportunity costs of time for full-time regular employment is higher. The larger the size of the family landholding, the larger is the earning from the family farm, and the greater is the regular wage needed to be offered to induce a landed labourer into a regular job. Thus, according to the opportunity cost of time, landed and landless labourers choose between casual and regular contracts.

H6. Given a lower opportunity cost of precommitting time, landless labourers prefer to choose regular contracts more often than landed labourers do.

(5) It is also shown that all these models predict a significant role for alternative employment opportunities (in the family or outside) as well. If there are brighter prospects of alternative employment opportunities which offer better wage and/or non-wage benefits, one or both of the following hypotheses may hold good:

H7. An increasing availability of alternative employment opportunities may reduce the supply of regular labour.

H8. An increasing availability of alternative employment opportunities may necessitate an upward revision of the regular wage and non-wage benefits so as to encourage participation in the regular market.

3. The Chapters

Chapter one examines the empirical and theoretical background of studying the choice between casual and regular contracts in agriculture. Chapter two develops theoretical models to explain the contractual choice from the point of view of employers as well as of labourers.

Subsequent chapters analyse the empirical issues related to this choice. Chapter three describes the data-set used, analyses the distribution of land and non-land resources in the study villages, and classifies farms according to the existing distribution of resources. Chapter four analyses some aspects of labour and credit markets in the study villages set within the large Indian context with a view to examining the rationale of contractual choice; in this context, the validity of hypotheses H1, H3 and H5 is examined.

Chapters five, six and seven focus on the econometric issues where we examine the hypotheses relating to the nature and evolution of contractual choice in the study villages. Chapter five examines the farmers' choice of labour contract with special reference to hypotheses H2 and H4 while chapter six considers the workers' choice of contract and the nature of their market participation; in this context, the validity of hypothesis H6 is tested. Finally, chapter seven examines hypotheses relating to the changing pattern of labour contracts, i.e., H7 and H8. The dissertation ends with a summary of findings in the concluding chapter.

CHAPTER 1. CASUAL AND REGULAR CONTRACTS : EXISTING EMPIRICAL AND THEORETICAL LITERATURE

Introduction

This chapter attempts to survey the existing literature on the choice between casual and regular labour contracts prevailing in rural India. The chapter is developed as follows. Section 1.1 examines the contribution of village-level studies in India. The findings of different village-level studies give rise to a number of stylised facts suggesting different circumstances when casual and regular contracts are chosen in different parts of India. Section 1.2 examines the extent to which existing theories, namely, segmented labour market (SLM) theory and agrarian contracts theory, explain these stylised facts. Finally, in section 1.3, an alternative framework of analysis is suggested in order to extend the existing literature.

1.1. Existing Village Level Studies

This section examines the findings of a number of village-level studies conducted in different parts of India. Given the availability of innumerable such studies, attention is paid only to those which specifically highlight the dichotomy between casual and regular contracts.

Section 1.1.1 summarises the primary findings of a number of selected village studies while section 1.1.2 analyses the basic features of casual and regular contracts; section 1.1.3 enumerates the stylised facts. In the light of these stylised facts, the section is concluded with the identification of a number of characteristic features of the labour markets in particular villages studied in this thesis (hereafter 'the study villages').

1.1.1. Village Level Studies in India

Since the 1950s, thousands of intensive village-level surveys have been conducted in different parts of India. Most are general surveys performed by anthropologists, geographers or economists. Only a few concentrate on agronomic, nutritional or other specific socio-economic aspects.

Land-labour arrangements in agriculture may refer to both tenancy and hired labour contracts. There has been a series of studies to explain different types of tenancy arrangements prevailing in India (e.g., Bardhan and Rudra, 1980). We, however, abstain from studying these diverse tenancy contracts and focus, instead, on hired labour contracts only.

An interesting feature of the hired labour market in Indian agriculture is the wide diversity of labour contracts prevailing in different parts of the country[1]. The most basic classification is between casual and regular (attached) labour contracts. Casual labour contracts can be of different types. According to the system of wage payment, they can be daily-rated or piece-rated. Secondly, casual labour may involve individual or group contracts; in the latter case, usually a group of casual labourers headed by a leader enter a contract with the farmer to perform some tasks. Finally, there is a pronounced male-female division in the casual labour market where certain agricultural tasks are reserved for female labourers. However, women are excluded from regular contracts so that the regular labourers are predominantly male.

Most village studies in India focus primarily on wage and employment determination in the casual labour market with a view to hypothesizing the surplus labour argument in agriculture. Rudra (1982b) finds that the competitive condition of the same price for the same commodity in a particular market does not always apply. Casual male labourers with different productive qualities receive almost the same wages in a particular village for a particular operation.

Drèze and Mukherjee (1987), like Rudra, have analysed the determination of wages in the casual labour market. In particular, they have examined the explanatory power of the existing theories like the theory of implicit contract, efficiency wage theory and subsistence theory.

Others like Reddy (1985) and Binswanger et al. (1984) consider the principle of wage determination in the casual labour market. They find that casual wages vary across different castes, sex and season. Reddy has also discussed the significance of the nature of tasks in the determination of casual wages.

However, there have been a few attempts to consider the principle of wage determination in the regular labour market. For example, Ghose (1980) finds that the 'annual wage of regular farm servants is determined outside the demand-supply framework since

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[1]For example, see, Bardhan & Rudra (1981), Rudra (1982a, 1982b), Bardhan (1984a), Binswanger et al. (1984), Reddy (1985), Drèze & Mukherjee (1987), Walker & Ryan (1990).

there are always more potential attached labourers than can be employed'. He discards the efficiency wage theory, and is in favour of accepting the subsistence theory to explain the determination of regular wage. Bardhan (1984a) also studies the principle of regular wage determination. He, however, finds that the monthly regular wage responds positively to the demand factors implicit in the 'village multiple cropping intensity' and general agricultural development index of the district, though he sheds doubt as to the ability of the efficiency wage theory to explain the regular farm wage in Indian agriculture. Using the All India Agricultural Labour Enquiry data, Basant (1984) compares wages for casual and regular labourers where he discusses the significance of both the demand and supply factors in the market for attached farm servants.

1.1.2. Casual and Regular Contracts

There is a wide variety of labour contracts prevailing in Indian villages. Bardhan and Rudra (1981) report that there are fully attached labourers (regular), semi-attached labourers, 'kirshans' and casual or unattached labourers[2]. Rudra (1982b)[3] reports a similar observation. Reddy (1985)[4] emphasizes that the incidence of regular employment (saldari) is declining in the Amaravati district while the relative significance of casual contracts, namely, daily or piece-rate contracts, is increasing in farm operations. Binswanger et al. (1984)[5] and Walker and Ryan (1990) have found that both regular and casual contracts prevail in their study villages; a further distinction is made between regular labourers who look after the livestock and those who take part in cultivation.

For the rest of this dissertation, we shall concern ourselves mainly with casual and

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[2]Casual and attached labourers dominate the rural scene. However, there is a wide variety of contracts that fall in between. For example, Kirshans are very similar to the fully attached labourers, but are paid in terms of a share of the produce (while the fully attached labourers have fixed annual wages). Kirshans, however, differ from share-cropping tenants in that they work on the employer's land with the employer's means of production under his direction. Secondly, there are semi-attached labourers. They have continuous association with some employers on a priority basis along with the freedom to work for other employers at other times. This guarantee of labour service is often based on the allotment of a piece of land by the employer.

[3]Rudra conducted an extensive investigation in two areas in Bolpur and Illambazar blocks in the Birbhum district near Shantiniketan (West Bengal, eastern India).

[4]Reddy's (1985) study is based on the information collected from the Amaravati district in Varhad region of Maharashtra state (western India).

[5]They studied the information collected by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) at Hyderabad, Andhra Pradesh. Since May 1975, ICRISAT is involved with the village studies at six locations in south India; these are : Aurepalle and Dokur in the Mahbubnagar district of A.P., Shirapur and Kalman in the Sholapur district of Maharashtra and Kanzara and Kinkheda in the Akola district of Maharashtra.

regular contracts only. This classification is primarily based on the duration of the contract, although these two types of contracts also differ with respect to the basis of payment, medium of payment, frequency of payment etc. This classification is a useful simplification; it incorporates a variety of factors operating in the rural labour markets in India and allows us to study the essential implications of this dichotomy - its causes, consequences and evolution.

The following sub-sections summarise different facets of these two types of contracts.

1.1.2.1. Regular Contracts

Large farmers in different parts of India hire some regular labourers for the whole agricultural year (Basant, 1984; Walker & Ryan, 1990), and/or sometimes for a particular crop season, say, in the production of cotton or irrigated paddy. By the end of the stipulated period, the contract can again be renewed, provided both parties agree. Regular farm servants dominate in tasks like soil preparation, fertilization, irrigation (Agarwal, 1981; Reddy, 1985)[6]. However, such labourers may have to do other work as well, for example, in the slack season they may do some non-farm work for the employer.

At the beginning of the contract period, the nature of work (farm work/livestock rearing etc.), and wage and non-wage payments are decided. Daily hours of work are usually flexible and may increase with greater work pressure on the farm, especially when tasks like irrigation start. Regular farm servants may be paid monthly or at regular intervals over the contract period. In many instances, a significant portion of the contract wage is taken as advance/loan[7] (Walker & Ryan, 1990; Mukherjee, 1991). In some areas, regular labourers are given a homestead to live in (Bardhan, 1984a) or some bonus/gifts during the harvesting season (Alexander, 1973). Some employers also offer one or more meals per day, and a blanket and/or a pair of chappals (Indian sandals) to the regular labourers once a year (Binswanger et al., 1984)

Usually labourers from landless households or those from lower castes participate in the market for regular farm servants (Basant, 1984). Almost all studies indicate that regular farm servants in Indian villages are predominantly male.

Some studies (Bhalla, 1976; Gough, 1983; Binswanger et al., 1984) report that there is a division even among the regular labourers themselves. Bhalla observes that in Haryana

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[6]These are the tasks that are both difficult to supervise and need to be performed regularly.

[7]If the amount as an advance taken in the beginning of the year exceeds the annual wage to be received, the excess is termed a loan and interest is charged on the loan.

agriculture, there are two tiers within the class of attached labourers where labourers from the landed households occupy the upper tier. Thus family landholding acts as the dividing line between labour arrangements. Gough observes that in Thanjavur villages, caste acts as the dividing line between two tiers of attached farm servants (locally known as paniyals) where the higher-caste labourers are found in supervisory jobs receiving higher wages. Binswanger et al. report that there are two groups of regular labourers in the ICRISAT villages; some look after the livestock while others participate in farm activities.

1.1.2.2. Casual Contracts

Casual contracts usually predominate in tasks like transplanting, weeding or harvesting[8]. An individual or a group of individuals may be contracted to perform a particular task for certain agreed hours in the day. Usually, the number of hours worked a day are less than those in regular contracts which are less flexible.

There are usually two alternative systems of payment, namely, daily-rate and piece-rate. A daily wage labourer is paid at the end of each day. The worker is paid even if s/he shirks. If there is close supervision (e.g., if a member of the employer's household works alongside the hired labourer), s/he may be forced to put in the required amount of work. However, in this case, there is the cost of supervision. Sometimes, the employer may reduce this cost by adopting a piece-rate payment. In this case, a contract is given to accomplish certain operations (say, transplanting or harvesting a plot of land) within a stipulated time. If the work is not done in time, labourers themselves are penalised for the delay. Hence, it is in the best interests of the workers to perform the task in time. However, quality may suffer in this arrangement because of the rush to complete the task.

Another variant of the piece-rate contract has been observed in some villages (Breman, 1974; Walker & Ryan, 1990), where a group of labourers headed by a leader enters a contract with the employer to perform a particular task. Payment is made for the whole group for a stipulated period of time. This is then divided among the group members. Usually, the leader gets a premium for his/her supervisory task. The leader is induced not to shirk because his/her identity is intertwined with that of the group. If the leader shirks, the group as a whole suffers or gets penalised by earning a bad reputation.

In addition, there are differences between male and female casual wages. Low caste and tribal women primarily participate in casual farm employment and receive lower wages

[8]Sometimes, it is argued that these are the tasks that are easier to supervise and have to be completed within a short period of time (usually it varies from a few days to a week) (Reddy, 1985; Drèze & Mukherjee, 1987).

than men and yet are unemployed for most of the year. 'Employers and male labourers rationalize lower female wages in terms of an alleged efficiency difference. But the fact is that their wages are lower even in operations like transplanting in which they are recognized to be more skilled and specialized' (K. Bardhan, 1984).

Secondly, there are differences according to the nature of the tasks as well. This is usually related to the specific season of the year[9]. Daily casual wages vary distinctly over the slack and peak seasons of the year. However, the daily wage of a casual labourer of a given sex for a particular task in a given season is surprisingly uniform in a particular village across farms (Bardhan & Rudra,1981; Rudra,1982b; Reddy, 1985; Drèze & Mukherjee, 1987). On the other hand, there is no such standard wage paid to regular farm servants who are predominantly male. The regular wage, in this case, is found to vary from one farm to another even in a single village (Bardhan & Rudra, 1981).

1.1.2.3. A Comparison

The significance of seasonality of agricultural production in the choice of labour contracts in rural India cannot be ignored. It has explicitly been acknowledged by Bardhan (1984a): 'Weather dependence not only makes the timing of each individual operation somewhat unpredictable, it also means that when the time comes the job has to be done very quickly and there are various risks and costs of delay'. He argues that employers offer some regular labour contracts at the beginning of the agricultural year in order to ensure a timely and ready supply of labour which minimises both recruitment costs and wage fluctuations over the slack and peak periods. Eswaran and Kotwal (1985a), Guha (1989), Mukherjee (1991) and Dasgupta (1993a) have also argued from different perspectives that the coexistence of regular and casual contracts in Indian agriculture can to a large extent be attributed to the seasonality of agricultural production.

Regular workers work for longer hours and perform a wide range of tasks for the employer. Regular wages are fixed for a specific period and are not subject to variation according to the type of work or the demand for labour.

The daily wage paid to a regular labourer is usually less than that paid to a casual labourer. However, by the very nature of the contract for regular labourers, annual wage income from regular employment is usually higher than that from casual employment. Binswanger et al. (1984) find that the cash equivalent of the total monthly regular wage is

[9]Some tasks are extremely sex-specific. For example, transplanting and weeding are usually performed by females while ploughing is undertaken by male labourers. However, in tasks like harvesting, usually both male and female labourers are hired. The practice often varies from one village to another.

greater than the Ryan-Ghodake monthly wage equivalent (monthly casual wage). Using All India Labour Enquiry II and Farm Management Survey data, Ghose (1980) observes that the daily regular wage is lower than the daily casual wage in every state of India except Bihar. Using the same data-set, Basant (1984), however, finds regular daily wages are higher than casual wages in Bihar, Mysore and Bombay, equal to casual wages in West Bengal and lower than casual wages in Andhra Pradesh, Assam, Kerala, Madhya Pradesh, Orissa, Punjab, Rajasthan and Uttar Pradesh. In an earlier study, using the Intensive Survey of Agricultural Labour data (Vol. 1 - All India), Sanghvi (1969) finds that the average daily wage of a regular labourer is less than that of a casual labourer, and he argues that the wage differential reflects the security of employment and the indivisibility attached to the regular contract.

Unlike casual labourers, regular farm servants are entitled to some additional facilities (credit etc.). For example, regular farm servants in some south Indian villages have even been found to obtain some interest-free credit. This seems to act as the principal motivation for individuals entering regular contracts (Binswanger et al., 1984; Walker & Ryan, 1990). Alexander (1973) studies the case of regular farm servants (paniyals) in Kerala; paniyals are found to receive bonus and gifts at harvest time and loans during the lean period. Casual labourers do not usually obtain such fringe benefits[10].

1.1.3. Stylised Facts

The above discussion gives rise to a number of stylised facts:

SF1. Seasonality of Production and Employment. Given the seasonal fluctuations of agricultural production over the peak and slack periods (Bardhan, 1984a; Mukherjee, 1991), labour demand is low in the slack season so that seasonal idleness of regular labour is an important consideration for farms (Guha, 1989).

SF2. Heterogeneity of farms. Given a high degree of inequality in the distribution of land and non-land resources, only a few farms are large while a majority of the farms are small or medium. Usually, the larger farms hire regular farm servants while the smaller ones rely on casual labourers (Basant, 1984; Walker & Ryan, 1990).

SF3. Heterogeneity of tasks. There are differences in the nature of tasks performed;

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[10]Rudra (1982a) and Bardhan (1984a) have mentioned that even besides the regular farm servants, there is a wide class of labourers in different villages in West Bengal who obtain loans from the employer during the agricultural lean period on the condition that they provide labour services to the employer in the peak period, usually at the wage prevailing in the slack period (forward contract). However, neither in my data set from the ICRISAT villages nor in any other studies in India have such additional benefits offered to the casual labourers been observed.

sometimes, casual and regular contracts on a farm are identified with different types of tasks (Agarwal, 1981; Eswaran & Kotwal, 1985a)[11].

SF4. Heterogeneity of workers. Regular farm servants are predominantly male and a majority of regular farm servants come from poor landless households in the villages and usually belong to the lower castes. Most are without many alternatives (Alexander, 1973; Basant, 1984).

SF5. Casual-regular wage differential. Usually daily earnings from regular contracts are lower than daily casual wages (Sanghvi, 1969; Ghose, 1980; Basant, 1984).

SF6. Additional non-wage facilities. Regular labourers usually receive some non-wage facilities like credit, bonuses, gifts, homestead land etc. in addition to their wages (Alexander, 1973; Bardhan, 1984a; Binswanger et al., 1984; Bell and Srinivasan, 1988).

The significance of seasonality (SF1) has been discussed in the literature (Bardhan 1984a, Guha, 1989; Mukherjee, 1991 etc.); though Guha (1989) has remarked on the element of seasonal idleness of maintaining a steady pool of regular labour in a nutrition-efficiency framework, its significance has not explicitly been considered in the existing empirical studies. Moreover, stylised facts like SF2, SF4, SF5 and SF6 have not received much attention while SF3 has been considered by Eswaran and Kotwal (1985a) only. Our analysis intends to account for these stylised facts.

1.1.4. Evidence from the Study Villages

The empirical analysis in the dissertation is based on the information collected by the ICRISAT from three villages, namely Aurepalle, Shirapur and Kanzara. The same data set has been used by Binswanger et. al (1984) as well as Walker and Ryan (1990). Their primary findings are consistent with mine; e.g., they have observed that daily regular wage is lower than daily casual wage and that regular labourers obtain interest-free credit facilities from the employer. However, my own research brings out some additional features of the labour contracts in the study villages.

(a) The larger farms not only possess more land, but also more non-land resources[12].

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[11] Agarwal (1981) has observed that regular farm servants are employed primarily in the more responsible tasks like ploughing and irrigation. Reddy (1985) has observed that regular contracts are allocated certain tasks required to be performed regularly and more responsibly. Reddy, Drèze & Mukherjee (1987) have discussed the advantages/disadvantages of daily and piece-rate casual contracts in certain agricultural operations like transplanting, weeding and harvesting with a view to minimise supervision costs as well as ensure quality.

[12]See further discussion in chapter three.

The distribution of resources in the study villages is quite unequal so that there are only a few large farms while the majority are smaller ones.

(b) The larger farms (belonging to the large and medium landholding class in the ICRISAT data set) are the major demanders of regular farm servants[13] as opposed to the smaller ones.

(c) On an average, the regular labour content relative to casual labour content is found to be higher in the slack period tasks like soil preparation, irrigation and fertilization in the larger farms[14]. This is especially true in the production of paddy in Aurepalle and cotton in Kanzara.

(d) In general, individuals from landless/labour households (as defined in the ICRISAT data) participate in the regular farm servants' market[15,16].

(e) The extent of involuntary unemployment increases in the slack period of agricultural production[17].

(f) With increasing government support, there is a general reluctance among the rural labourers to participate in regular farm jobs[18].

1.2. Existing Theoretical Studies

There have been few attempts to analyse the coexistence of casual and regular labour contracts. The existing literature can be divided into two broad schools of thought, namely, the Segmented Labour Market (SLM) theory, and the agrarian contracts theory.

1.2.1. Segmented Labour Market Theory

As the very name suggests, this school of thought highlights the division between

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[13]See further discussion in chapter five.

[14]See further discussion in chapter five.

[15]See further discussion in chapter six.

[16]Credit occupies a central role to smooth out production and consumption over slack and peak seasons. However, given the collateral requirement for formal credit, poor landless labourers are practically excluded from the formal (cheaper) credit market.

[17]See further discussion in chapter six.

[18]See further discussion in chapter seven.

different segments of labourers, say, between male and female or that between black and white labourers, primarily in the industrial labour market. At first, the theory was developed in the tradition of institutional labour economics. The central idea can be identified as the Segmented Labour Market theory or, more specifically, its variant the Dual Labour Market (DLM) theory. According to Doeringer and Piore's (1971) pioneering exposition, an operationally meaningful definition of segmentation implies the following : (i) the segments of the market include distinctly different groups of individuals differentiated by such characteristics as caste, sex, age, wealth or education, and (ii) individuals can move from one segment to another only with substantial difficulty. In other words, the emphasis is clearly on the difference in exogenous workers' characteristics (black and white, male and female, etc.) between primary and secondary sectors of employment.

1.2.1.1. Early Notion

In the usual formulation of the dual labour market theory, the labour market consists of two sectors - a high-wage primary sector with good working conditions, stable employment and substantial returns to human capital variables, and a low-wage secondary sector with bad working conditions, unstable employment etc.

Secondly, primary sector jobs are rationed, i.e., all workers eligible for primary sector jobs cannot secure one. Workers form queues for these jobs in the primary sector and are selected on the basis of their trainability and future loyalty. Employers tend to choose (discriminate) in favour of those who are viewed as traditional career-minded workers and, also in favour of workers with ethnic or cultural backgrounds (whites in general, as opposed to blacks or hispanics) similar to those of the managerial class. The rejected applicants and the rest obtain jobs in the secondary sector.

Each of the two sectors influences the worker's preferences, attitudes and habits in ways that reinforce and shape the long-run progress or lack, thereof, of the worker's career. In the secondary sector, low wages, lack of upward mobility and instability of tenure have negative feedback effects on workers' attitudes towards work and training. In other words, the primary sector is shown to be a better sector of employment not only with respect to wage income, but also with respect to other peripheral advantages like security of employment or the prospect of upward mobility.

However, the allocation of workers (white and black or male and female) between primary and secondary sectors is somewhat arbitrary. Discrimination may perpetuate job segmentation by restricting certain workers to secondary firms - not so much because they lack education or skill per se, but more because these workers are perceived as having outward characteristics resembling those of other workers in the secondary labour market'. So it seems that discrimination might be one reason for segmentation to persist; but it does not appear to be a very convincing explanation.

According to Weitzman (1989), the 'dual labour market approach is somewhat harder to characterize'; the theory identifies wages as being more attached to the job (primary and secondary sectors of employment) rather than to the worker (differences in the observable characteristics).

1.2.1.2. Recent Interpretation

Different tools of imperfect information theory have recently been incorporated into the dual labour market literature, giving rise to a newer interpretation. For example, Kenneth Arrow (1973) has supported efficiency wage considerations to sustain a dual labour market structure. He has focused on the employer's uncertainty about the productivity of different groups of workers, black and white or male and female.

Bulow and Summers (1986) have argued that firms are unable to measure perfectly the amount of effort workers are putting forth, especially in primary jobs, which again emphasizes the role of task characteristics to explain the dichotomy. One way of eliciting effort is to pay higher wages, thus raising the costs of finding replacement work. Jones (1987) has also explained the wage differential between primary and secondary jobs along the same lines. These later attempts suggest that a convincing explanation of market segmentation needs to account for different cases of market failure due to the problems of information and uncertainty.

1.2.1.3. Wage Differential : Some Explanations in the SLM Literature

The SLM literature suggests a number of factors to explain the wage differential between primary and secondary sectors of employment. These are summarised below :

(i) *Differences in production technology across sectors.* While a typical job in the secondary sector is relatively simple and easily supervised, primary jobs are complicated, requiring a fair degree of responsibility. Recent work (Bulow and Summers, 1986; Jones, 1987) emphasizes the fact that supervision is difficult in the primary sector and, hence, there are better wage and non-wage benefits.

(ii) *Differences in individual characteristics* (age, sex, race, education) also play an important role in potential workers choosing between primary and secondary sectors. For example, it may be imperative for the employer to hire more educated workers for primary jobs and, hence, pay higher wages. However, choice of white or male workers as against the black or female is regarded as racial or sexual discrimination which is pronounced in the job market. Becker (1957) considers market discrimination[19] to be the result of personal tastes of participants.

Some authors (Arrow, 1973) have considered the problem of screening a group of workers from the set of potential ones; according to them, screening the better workers from the potential ones, in an imperfect information world, maintains the wage differential between the primary and secondary sectors.

(iii) A third plausible explanation is the *compensating differential for non-wage job attributes* which include factors like differences in average weekly hours spent on different tasks, or job tenure or the quit rate for certain jobs which directly affect the utility of the workers[20].

1.2.2. Agrarian Contracts Theory

Distinct from the tradition of the dual labour market theories, development economists have occasionally advanced some economic models which explain the choice of contracts in agriculture. These models are primarily based on the theories of uncertainty and information, which can further be distinguished into four major strands.

(a) Bardhan (1979a) argues that the prevalence of regular farm contracts in Indian agriculture minimises the recruitment costs of employing labour. He argues that in order to ensure a quick and ready availability of labour in the peak period, employers enter explicit or implicit contracts with a group of labourers in the slack period. Even if the slack-period wage rate is greater than the marginal product of labour in the slack period, the employer saves on the recruitment costs in the peak period so that the peak- period wage is less than the marginal product in that season.

In a later paper, Bardhan (1983)[21] further argues that employment of regular labourers helps reduce the wage fluctuations over the slack and peak periods. Risk-averse

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[19]If employers prefer to hire workers from group A rather than group B and are willing to sacrifice profits to do so, they may be said to have discriminatory tastes.

[20]This last explanation is obviously inadequate in situation where the nonwage attributes of primary sector jobs accentuate the difference between the two sectors. For example, compared to secondary workers, primary workers often enjoy more effective coverage of health and safety regulations.

[21]Both these papers (Bardhan, 1979a and Bardhan, 1983) are later included in Bardhan (1984a).

workers faced with an uncertain spot wage rate may decide to participate in long-term contracts with risk-neutral employers for a pre-negotiated wage which is lower than the expected spot rate; the difference reflects a risk premium.

(b) Eswaran and Kotwal (1985a) have developed a shirking model of efficiency wages to explain the farmers' choice of regular contracts. They have focused on the problems of disciplining workers in certain tasks which are difficult to supervise. They have postulated that the employment of regular labourers facilitates the assignment of such tasks to hired labourers without wasting resources on supervision. Under these circumstances, regular labour may substitute family labour to some extent. The regular wage is maintained at a level inducing the labourers to supply an acceptable level of effort (the idea being that a high regular wage raises the cost of being fired and thereafter acts as a disincentive against shirking). Any change in the casual wage necessitates a corresponding increase in the regular wage to be paid.

(c) Guha (1989) has developed a model which suggests that the prevalence of regular farm contracts internalises the economies of high wages. Assuming that (i) there exists a long-term relation between consumption and labour efficiency, (ii) long-term contracts are possible, (iii) production is seasonal and (iv) there is a trade-off between the positive effects of regular labour on productivity and the costly seasonal idleness of regular labour, he concludes that regular and casual contracts may coexist. Dasgupta (1993a, 1993b) has followed the same line to explain the coexistence of casual and regular contracts in Indian agriculture where higher wages are paid to the regular labourers in order to reap the benefits of higher productivity[22].

(d) Hallagan (1978) has analysed the choice between share-cropping, fixed-rent tenancy and wage contracts in agriculture. He highlights the problem of screening the best worker from the set of potential workers in an asymmetric information world. Adverse selection problems may prevent the markets from operating efficiently. Hallagan argues that if all the individuals are risk-neutral in a world where the costs of monitoring and enforcing contracts for the provision of entrepreneurial ability are high, a combination of wage, share and rent contracts may reveal the types of workers by the choice of their contracts and match landlords' need with workers' endowments of entrepreneurial ability. Eswaran and Kotwal (1985b) point out that Hallagan's assumption that landlords are ignorant about tenants' entrepreneurial abilities is not a realistic one in most rural economies; instead they focus on the non-marketed resources in agricultural production. They have developed an endogenous

[22]Further see our discussion in chapter two.

model of contractual choice where they argue that wage, rent and share-cropping contracts reflect different techniques of combining the non-marketed inputs of ability to supervise and managerial ability among the agents, and making them the residual claimants.

1.2.2.1. Main Features

Rural labour markets in India display diverse features and trends. Each of the existing developmental models chooses to focus on particular aspects of these markets, while making a number of simplifying assumptions about the remaining aspects.

(i) The starting point of these models is that farms are identical. Clearly in reality farms are not identical; in particular, some farms are larger and their owners wealthier than others. Differences in wealth will be reflected in the choice of input-output mix, optimum production technique etc. Moreover, it has been observed that larger farmers hire regular farm servants while smaller ones rely more on casual labourers. Hence, one needs to incorporate the possibility of farms being heterogeneous in size and income.

(ii) Apart from the nutrition-based efficiency wage models, all the others, referred to here, have emphasized the factors affecting each farm's demand for labour in the market while disregarding the role of individual preference in the prevalence of these contractual arrangements. In doing so, it has been assumed that workers are identical. Hallagan's model is slightly different in that it assumes that workers are different with respect to entrepreneurial ability. However, given his emphasis on screening problems, his argument, too, revolves round the forces of demand. Guha and Dasgupta have, however, emphasized the nutrition and productivity of available workers. In doing so, they have assumed a fixed demand for labour from farms and, thus emphasized the supply of labour and disregarded the demand factor. In other words, nobody has so far looked at both the demand and supply side of the choice of contract in agriculture.

(iii) Eswaran and Kotwal assume an effort-augmenting mechanism in regular contracts. Guha and Dasgupta argue that higher wages paid to long-term regular labourers prevent the problem of malnutrition; the benefit of higher nutrition and, therefore, of higher productivity accrue to the employer. Questions may arise, however, as to the validity of the efficiency wage argument in rural labour markets. It appears from our discussion in section 1 of the chapter that the wage (if we focus on daily wage only) paid to a regular labourer is not necessarily higher than that paid to a casual labourer. Hence, the economies of higher wages (efficiency wages) as such may not be appropriate to explain the existing dichotomy in rural labour contracts. It can still be argued that regular labourers, in different parts of

India, receive most of their wages in advance (credit) which casual labourers do not (for a further discussion, see chapters two and four).

(iv) Finally, questions may be raised as to the extent of the information problem. In a closed village society, a particular employer knows the labourers of the locality individually and has a continuing association with some of them. Even among those whom he may not employ regularly, there are some on whom he can depend on not to let him down when he requires labour urgently. This implies that an employer has some information, though imperfect, about the quality of workers whom s/he is employing (Rudra, 1982b), thus weakening the basis of theories based on the notion of asymmetric information such as Hallagan's. The implication of the negation of this assumption is that workers' heterogeneity alone (with identical farms) would not suffice to explain the dichotomy in the rural labour market.

Our analysis aims to redress these issues.

1.2.3. A Comparison

There are similarities and differences between the two strands of the literature discussed earlier, namely, SLM theory and agrarian contracts theory. The similarity is that both of them mark a deviation from the competitive, market-clearing mechanism and emphasize the incorporation of the theory of uncertainty and information.

The difference is primarily related to the various patterns of demand for labour. Dual labour market theory is usually applied to the dichotomy between male and female labourers or that between black and white labourers in the industrial sector. In this case, a primary sector employer hires primary workers, while in a secondary sector an employer hires only secondary workers.

On the contrary, in an agricultural labour market in developing countries (as referred to in agrarian contracts theory), a wealthy employer is observed to hire both regular and casual labourers over the slack and peak seasons. Eswaran and Kotwal have emphasized that casual and regular workers are hired to perform two types of tasks over the slack and peak periods[23]. They emphasize the problems of supervision and monitoring in certain agricultural tasks. To this extent, Eswaran and Kotwal's argument shares the view of Bulow and Summers (which, too, stresses the difference in the nature of the tasks to explain the

[23]Eswaran and Kotwal assume that all farms are identical and, hence, ignore the effect of farm-size on the incidence of regular farm contracts.

dichotomy between primary and secondary sectors), subject to the difference already mentioned.

Secondly, in the SLM literature, primary sector jobs are undoubtedly preferred by all the labourers. However, the trade off between regular and casual farm contracts in agriculture is not so obvious. The daily earnings in a casual job are usually higher than that in a regular job with employment security (the lower daily wage of regular farm servants may be regarded as a premium for employment security offered), though the annual wage of a regular labourer may be higher. Besides, regular farm servants usually obtain some additional benefits like bonus, credit or homestead; though they may have to work for longer hours without much independence.

In its original formulation, the choice of employment in segmented labour market theory was based on the exogenous characteristics of the workers, their race or sex. However, workers' characteristics are endogenous to the choice of contract in the agricultural labour market. Even if it is assumed that they are identical in ability, they may have different family obligations, time constraints, and alternative opportunities. Other factors like work conditions, job status (Rudra, 1982a[24]), employer's characteristics etc. may also play a role in the choice of contract. Hence, the net benefit (utility) from a contract will vary between individuals with different characteristics. Some may prefer regular farm contracts, while others may not.

Thus, the segmented labour market theory fails to account for the intricacies of contractual choice in an agricultural labour market. Hence, for the rest of the dissertation, we shall primarily concern ourselves with the theory of agrarian contracts.

1.3. Proposed Analytical Framework

In light of the preceding discussion, it appears that agrarian contracts theory needs to be extended so as to address the following issues:

(a) Theories on agrarian contracts assume that farms are all identical and, hence, fail to incorporate the farm-size factor.

(b) Though Bardhan (1984a) has considered the minimisation of wage fluctuations

[24]It has been found that workers do not like to be totally at the beck and call of the employer; they want freedom and like to be their own boss. This general feeling has also been observed in the ICRISAT villages (Walker & Ryan, 1990).

over the slack and peak periods, most models do not usually take account of the wage difference between casual and regular contracts. However, the casual-regular wage differential per period may have an important bearing upon the coexistence of casual and regular contracts in Indian agriculture.

(c) The importance of seasonality of agricultural production has been acknowledged by Bardhan (1984a) and Eswaran and Kotwal (1985a). While Bardhan considered the fluctuations of wages, Eswaran and Kotwal focused on the nature of tasks performed during slack and peak periods. However, given the problem of seasonality, seasonal idleness of regular labourers is an important consideration for the farms, especially for the smaller ones. This has not been incorporated explicitly[25].

(d) The role of family landholding/wealth of the potential workers on the choice of contract is another neglected aspect of the agrarian contract theory. In a general framework, Atkinson (1983) has discussed the significance of family characteristics in occupational choice; however, little has been done to distinguish the choice of contract between landed and landless labourers.

(e) Most available studies focus on the demand for labour and, in doing so, the role of worker's preferences in the choice of contract has been overlooked. The following considerations are relevant in this regard:

(i) Usually the casual daily (farm) wage is higher than regular daily wage;

(ii) Besides casual farm jobs, casual non-farm jobs are also available where wages are even higher.

(iii) By the very nature of the contract, casual wages are paid even if someone is found to shirk, in cases where effort is non-monitorable.

(iv) Employers complain about the non-availability of good regular farm servants[26].

These findings suggest that workers' preferences need to be incorporated into the analysis of contractual choice in Indian agriculture.

The aim of this thesis is partly to develop a theory which addresses these issues and provides a sound explanation for the coexistence of casual and regular contracts. It is useful to begin with a discussion of employees' and employers' considerations.

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[25]Guha (1989) has considered the issue only in the context of nutrition-based efficiency wages.

[26]This has been noted by Walker and Ryan (1990). This has also been observed during my resurvey of Aurepalle.

1.3.1. Employers' Considerations

The following considerations are relevant to employers' preferences between casual and regular contracts.

First, production in traditional agriculture is seasonal in nature with labour demand being lower in the slack period of production. Hence, maintaining a steady pool of regular labourers throughout the year may involve a cost of paying regular labourers when their productivity is low. We will refer to this as 'hoarding cost'. Larger farms not only have the advantage of greater size of landholding, but they also have better access to other complementary factors of production per acre, including irrigation[27]. Due to this, larger farms have a larger and more uniform demand for labour throughout the year as compared to the smaller ones. Consequently, hoarding costs are lower in larger farms. Moreover by virtue of the ownership of land and non-land resources, larger farms are wealthier and, hence, they are less risk-averse than the smaller ones. Consequently, larger farms may be willing to bear the hoarding costs of hiring some regular labourers, and to provide some insurance to regular labourers in the form of stable employment and wages. In return for this insurance, regular labourers may be willing to accept a lower wage.

Secondly, given that workers may vary with respect to non-observable characteristics (say, physical or mental ability), the selection of workers from the pool of prospective ones may be difficult. Employers may not be able to detect who is a better worker. In this kind of asymmetric information situation, employers may offer different types of contracts to screen the better workers such that the workers' choice of contract itself reveals their true types. However, as Rudra (1982a) argues, the problem of screening may not be an acute one in a closed village society. Indeed, in a small village everybody knows each other. Employers and employees have sustained contractual relationships and, hence, employers have a fair but imperfect idea of the quality (even if non-observable) of the labourers.

Thirdly, once hired, a conflict of interests may arise between the employer and labourers. Increasing effort enhances production, but reduces the utility of the workers. Workers may prefer to put in less effort while employers want more. Disciplining workers may be particularly difficult in the larger farms[28] and, especially, in certain tasks. Tasks like

[27]For example, larger farms own more complementary factors like irrigation, livestock, the farm/non-farm equipment, financial assets etc. per acre (see chapter three).

[28]Larger farms employ a larger labour force, sometimes spread over different plots; this makes supervision particularly difficult.

soil preparation, irrigation and fertilization are difficult to supervise[29] as opposed to tasks like transplanting, weeding, harvesting etc. While the former may be called 'non-monitorable' tasks, the latter are 'monitorable' tasks. Fruits of the non-monitorable tasks are realized only after the harvest and, therefore, quality control in these tasks is an important consideration. Hence, the need for differentiated contracts may arise in the performance of monitorable and non-monitorable tasks. In chapter two, we will develop a model where regular contracts, together with appropriate incentives, are used to ensure adequate performance of non-monitorable tasks.

Given the conflict of interest between the employer and employees, one way of disciplining labourers with minimum supervision costs is to offer some incentives. Provision of credit offered to regular labourers in different parts of India may work out to be more efficient than ordinary credit contracts. The former is supposedly more efficient because the farmer not only earns the interest, but also minimises the moral hazard problem (Ray and Sengupta, 1989). If the labourer is fired, he not only loses the wage, but also the additional facilities, which are otherwise difficult to obtain. Farms which face more acute supervision problems (e.g., larger farms who manage a larger labour force, often dispersed over different plots in different parts of the village) may be particularly inclined to offer incentive compatible regular contracts with additional facilities.

Finally, there are different kinds of uncertainty in the organisation of agricultural production at different stages of production which may also affect the employment of regular labour. (i) Given the time-bound nature of agricultural operations, costs of unfavourable weather conditions may be enormous; (ii) seeds may not germinate; (iii) an attack of pests may harm the final crop. In certain regions where the costs of these uncertainties are very high, farmers may be induced to use more casual labour instead of incurring hoarding costs of maintaining regular labour throughout the year. On the other hand, timely supply of labour is very important for agricultural production, especially for certain operations. When the time comes for these operations, labour has to be applied immediately. If there is an uncertainty of securing a steady supply of labour in certain localities, the costs of delay may be enormous. Under these circumstances, farmers may be induced to employ some regular labour irrespective of uncertainties of the kind of (i), (ii) and/or (iii)[30].

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[29]The nature and the importance of tasks are also dependent on the characteristics of the crop. For example, in the production of irrigated crops, the importance of soil preparation, irrigation and fertilization assume greater importance compared to the dry crops.

[30]However, we do not consider the question of timeliness of labour because there does not exist any excess demand for labour in most Indian villages.

1.3.2. Employees' Considerations

Given the demand for labour, workers with given personal and/or family characteristics, will attempt to choose the contract with the highest level of utility. Whether workers are identical or heterogeneous, effort reduces utility and, hence, they will try to put in a minimum amount of effort.

By the very nature of agricultural production, most employment prospects are seasonal in nature (apart from a few regular jobs available in the village). Alternative non-farm job prospects are also quite limited in most villages in India. Hence, employment security may be an important consideration for the participants in the market, especially the landless workers who do not have many better alternative employment opportunities.

Secondly, in the unskilled market for agricultural labour, the importance of personal characteristics like age or sex may be negligible. However, in these household economies, the role of some family characteristics like the family ownership of land and non-land assets of these labourers cannot be ignored in the choice of contract. Usually, workers from families with larger landholding (who also own more non-land resources) are frequently required to work on their family farm. Hence, they are unable to precomit themselves for the whole production season to work for any employer. This time constraint excludes them from the possibility of choosing regular contracts. On the other hand, in the absence of any responsibility for family farming, landless labourers are able to precomit their entire non-leisure time in the market and, hence, are likely to participate in regular contracts.

Thirdly, the availability of credit is crucial in supporting the rural labourers in low-income countries, especially in view of the absence of unemployment insurance markets in these economies. The problem is particularly acute in semi-arid areas where crop failure is common and, hence, credit occupies a central role in smoothing out production and consumption over the slack and peak seasons[31]. Credit constraints are particularly severe for the poorer landless labourers. Land is usually regarded as the most acceptable form of collateral in these low-income countries and, therefore, individuals from landless households are unable to offer the necessary collateral. Hence, they are forced to go to the informal sector, and have to pay a much higher interest rate compared to that prevailing in the formal sector. Under these circumstances, regular contracts with some wage advance may be the preferred option for the poorer landless labourers; in effect, regular contracts enable them to use their labour as a collateral.

Finally, some informational asymmetry may prevail like the labourer may not know

[31]This is discussed in some detail in chapter four.

about certain characteristics of the prospective employer (whether wages are paid regularly, whether supervision is fair, etc.) before s/he actually works for the employer. This, however, is less of a problem in a closed village society where the characteristics of the employer may actually be common knowledge. But workers may have some personal values like the desire to be one's own boss, dislike of being closely supervised etc.; these factors may also influence the choice of contract in a significant way.

1.3.3. A Possible Outcome

In light of the preceding discussion of employers' and employees' considerations, regular labour contracts have the potential of being mutually advantageous. On the one hand, they provide workers with the opportunity to obtain regular employment with some loan/advance or some other form of additional non-wage facilities. The arrangement may be particularly attractive for the poorer landless labourers who can devote their entire non-leisure time to regular employment and who are unable to offer collateral to get credit from formal sources. In a regular labour contract the collateral requirement is substituted by the labour services promised to the employer/creditor.

On the other hand, employers gain not only by having a ready access to labour supply (particularly in some crops where continuous attention is required), but also at a lower cost. The employment of regular farm labourers also helps them (a) in minimising the costs of supervision and monitoring, especially in tasks difficult to supervise; (b) in ensuring the quality of performance; if the quality of performance of a particular task is not instantneously observable, but becomes observable over time then a regular labourer who does not perform adequately in such a task can be asked to improve his performance; (c) in minimising the wage fluctuations over the peak and slack period, (d) not only in earning an interest on credit offered to the labourer, but also in ensuring better control over the labourers. In case a labourer shirks, s/he will not only lose the job, but also the access to credit (which figures prominently in shaping his/her consumption over the slack and peak periods of employment). Thus, the informational problems in the credit market are found to spill over to the labour market in the form of regular contracts.

However, given the seasonality of agricultural production, the employment of regular farm servants only would be wasteful simply because there may not be enough demand for regular labour throughout the year. In other words, there are hoarding costs involved in maintaining a steady pool of regular labourers. Hence, employers may hire a few regular labourers to meet the regular demand for labour throughout the year, and to hire some casual labour on an ad hoc basis to meet the additional labour requirements at particular stages of the production cycles.

Regular contracts may be particularly relevant for certain types of tasks for which employment of casual labour is problematic. In the casual labour market, the piece-rate contract (individual or group-wise) has the advantage over the daily contracts that the costs of supervision can be minimised; but the quality of performance may suffer. Quality control may be an important consideration, especially, in certain tasks like soil preparation, fertilisation or irrigation (where the fruits of these tasks are realised only after the harvests). In these cases, regular farm contracts, combined with adequate incentives, may assume greater importance in ensuring the quality of performance as well as in minimising the costs of supervision and monitoring in view of the nature of tasks.

To summarise, the coexistence of regular and casual labour contracts in rural economies arises from different considerations of employers and employees, leading them to prefer each type of contract according to particular characteristics. The distinctions between smaller and larger farms (leading to different costs of 'hoarding' regular labour during the slack season), between poorer and wealthier labourers (leading to different time and credit constraints) and between monitorable and non-monitorable tasks, are particularly relevant.

CHAPTER 2. CASUAL AND REGULAR CONTRACTS : A THEORETICAL ANALYSIS

In chapter one, we have proposed a general framework for the analysis of choice of labour contracts. Taking into account the different considerations of employers and employees, discussed in chapter one, four different models are presented here: *(1) Implicit contract model; (2) Shirking model; (3) Collateral Model and (4) Time Constraint Model.*

The assumption common to all these models is that the casual labour market is competitive and clears through the demand-supply interaction everyday[1]. However, each model invokes a different argument for the prevalence of regular contracts.

The chapter is developed as follows. Section 2.1 gives an outline of the basic arguments involved in the above-mentioned models, and describes the general framework for the analysis of contractual choice. The subsequent sections 2.2, 2.3, 2.4 and 2.5 modify the general model to incorporate the respective arguments of each model. The chapter concludes with an overview of the models presented vis-a-vis other existing models.

2.1. The General Framework

This section develops a general framework for the analysis of choice between casual and regular labour contracts in Indian agriculture from the points of view of employers and employees. The analysis is developed as follows : section 2.1.1. presents the arguments of the models to be developed in the subsequent sections while section 2.1.2 builds up the general analytical framework for modelling labour demand.

2.1.1. An Outline of Primary Arguments

An outline of the models to be developed later is as follows:

(1) *Implicit Contract Model.* If farmers are risk-neutral and workers risk-averse,

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[1]This is strongly supported by the empirical evidence from different parts of India (see, Rudra, 1982a; Reddy, 1985; Drèze & Mukherjee, 1987).

farmers may insure a group of labourers against the fluctuations of wage and employment by offering them employment over a prolonged period at a predetermined wage. In the process, farmers will be able to pay a lower wage per day to the regular labourers as compared to the casual labourers, where the wage differential constitutes an insurance premium[2].

Together with the advantage of hiring regular labour, however, the employer has to take account the fact that, if 'resale' of labour is not possible (i.e., if employers cannot sell the labour of regular labourer to other farmers on days when their productivity on the employers' farm is low), then there is a cost involved in maintaining a steady pool of regular labour throughout the year. We shall refer to this as the 'hoarding cost' of regular labour (a formal definition will be given below). Given the existence of hoarding costs, farmers may not hire regular labourers only; they may hire some casual labourers as well. Hoarding costs may be particularly high for the smaller farms who have little need for hired labour during a large part of the year, thus inducing them to rely primarily on casual labourers.

(2) *Shirking Model.* The second model is a variant of the efficiency wage theory. Here we assume that some tasks are difficult to supervise, because effort is unobservable. Employment of casual labourers in these non-monitorable tasks may be inefficient since, by the very nature of the contract, casual labourers are paid even if they shirk. However, a regular labourer may be fired if the work is not done properly. Further, if the wage rate is higher for regular than for casual labourers, regular labourers will have an incentive to avoid being fired. Thus if a farm offers regular contracts with additional incentives, it may succeed in inducing the regular labourers not to shirk in the non-monitorable tasks, while employing casual labourers to perform other monitorable tasks.

In an implicit contract model, the regular-labour wage rate per period is less than the casual-labour wage rate per period while in a shirking model the regular-labour wage per period is greater than workers' reservation wage. This does not necessarily imply that the predictions from these two models are incompatible. If regular-labour wage rate is greater than workers' reservation wage, predictions from these models may still be compatible. However, note that if the shirking model is a full-employment model, then it implies that the regular labour wage rate is higher than the casual labour wage rate per period.

(3) *Collateral Model.* Rural credit markets in India are segmented between formal

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[2]What is meant here by 'wage per day' for regular labourers is simply the annual wage payment divided by the number of days in the year (in the villages we will be studying, regular labour contracts take the form of a yearly commitment of labour supply by the labourers in exchange for an annual wage payment). We will also refer to this 'wage per day' or the 'imputed daily wage' of regular labourer. This terminology should not obscure the 'indivisibility' of regular contracts.

and informal sectors. Credit is cheaper in the formal sector, though it requires some collateral to be offered. Land is the most acceptable form of collateral in these village economies. Due to their inability to offer the required collateral, it is difficult for landless labourers to secure credit. Hence, risk-averse landless labourers usually go to the informal credit market where the marginal cost of credit is comparatively higher.

Usually casual labourers are paid daily while a major portion of regular wages are paid in advance when the contract begins and no interest is charged on this advance. Consequently, regular contracts with advance (i.e., credit) payment may represent an attractive arrangement for landless labourers. If the marginal cost of credit is higher for asset-poor labourers than that for employers, and if there is no uncertainty about casual wages during the slack period, there exists a wage level for regular contract such that these contracts are beneficial to employers and labourers[3].

(4) *Time Constraint Model.* The opportunity cost of time is different for landed and landless labourers. Landless labourers do not have any obligation to spend labour-time on family land so that they can offer their entire non-leisure time in the labour market. On the other hand, landed labourers with obligations to work on family land cannot easily spare the time to participate in regular jobs. In other words, given that the opportunity cost of pre-committing time is lower for landless labourers, they have a comparative advantage in the choice of regular contracts.

The collateral model suggests that, given a higher marginal cost of credit, risk-averse landless labourers who cannot offer collateral are particularly likely to participate in the regular market; the time constraint model also suggests that, given a lower opportunity cost of time, landless labourers have a comparative advantage in regular contracts. Combining these two arguments together, we may, therefore, infer the following:

Risk-averse landless labourers prefer to participate in the regular jobs with wage advance such that the marginal cost of credit and opportunity cost of time are minimised[4].

It has also been shown that alternative employment opportunities (in the family or

[3]Another way of interpreting this situation, from the point of view of the employer, is that the rate of return obtained by lending to a labourer and persuading him to accept a wage cut is greater than the rate of return on loans in the formal credit market (this is similar to the point made by Ray and Sengupta (1989) that lenders often earn greater returns in interlinked contracts). In addition, interlinkage of credit and labour may have some productivity-enhancing effects, e.g., if the interlinked contract raise the cost of shirking and getting fired.

[4]The relevance of these two models strongly emerged from discussions with employers and employees during my field survey in Aurepalle (see further discussion in chapters three and six).

outside) play a significant role in the choice of labour contract. If there are brighter prospects of alternative employment opportunities which offer better wage and/or non-wage benefits, there may arise growing individual reluctance to participate in regular farm jobs. Under the circumstances, a number of outcomes are possible: (i) On the one hand, given scarcity of labour supply, farmers may adopt alternative contractual arrangements so that the incidence of regular farm contracts may decline. (ii) On the other hand, given the farmers' need for regular labour, regular wage and non-wage benefits may be revised upward so as to enhance labourers' incentive to participate in regular farm jobs vis-a-vis other casual jobs. Of course, it is also possible for both effects to take place at the same time. As will be seen in chapter seven, there is some empirical evidence that this process has indeed taken place in rural India in recent decades.

2.1.2. Modelling Labour Demand

Farms are all assumed to be identical. They organise production using labour and other inputs. Suppose the production of a particular crop takes several slack periods to produce, t = 0, 1, 2,...., T-1 where each slack period corresponds to a particular agricultural operation. After T slack periods, follows a peak period (T-th period) when the crop is finally harvested. Also suppose that there is no uncertainty in the slack periods while the amount harvested during the peak period is uncertain[5].

This scenario can be modelled as a two-stage production function, where an intermediate output X realized by the end of period T-1 (last slack period) is used in the final production function Q. Suppose at harvest time, labourers (whether they are casual or regular) receive a share of harvest as wages. We can then write output *net of harvest wages* Q as follows:

$$Q = g(l_0 \, , \, l_1 \, , \, ... \, , \, l_{T-1} \, ; \, \theta \, , \, K) \tag{1}$$

[5]The assumption of no-uncertainty in the slack period is rather strong. It is made in order to simplify the presentation and focus on the other features of direct interest. Even if there is uncertainty in the slack periods, the main arguments developed here would remain important. However, there would be some additional considerations, e.g., the fact that employing casual labour rather than regular labour gives the employer greater flexibility to deal with slack-period uncertainties.

where price of the final output Q is normalised to unity[6]. l_0, l_1,..., l_{T-1} are the labour inputs (measured in, say, labour-hours) in the slack periods[7], K is the size of landholding and θ is a random variable (e.g., rainfall) denoting production uncertainty in the T-th period. Production function g(.) is assumed to be concave in the inputs, continuous and twice differentiable.

In this model, we consider labour hiring decision, including the decision of whether and how much regular labour to hire at the beginning of the season (for the whole season). The following cases may arise :

(a) The simplest possible case is one where there is no regular labour. Let a farm's costs be as follows:

$$C = F + \sum_{t=0}^{T-1} w_t^C l_t \qquad (2)$$

where total labour demand l_t in any period comprises of casual (l_t^C) and regular (l_t^P) labour. In this case, we assume that $l_t^P = 0$ which, in turn, means $l_t = l_t^C$ for each t. Let w_t^C be the casual daily wage and F the fixed cost of production (e.g., the imputed land rental). A farm then maximises its expected profit π_1 as follows:

$$\pi_1 = E[g(l_0 , ... , l_{T-1} ; K , \theta)] - F - \sum_{t=0}^{T-1} w_t^C l_t \qquad (3)$$

First order conditions of this profit maximisation with respect to l_t are as follows :

$$E(g_t) = w_t^C \quad for \ t = 0 , 1 , 2 , ... , T{-}1 \qquad (4)$$

when g_t is the derivative of g(.) with respect to l_t. This, in turn, determines the labour demand functions as follows:

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[6]In this model, last period output is taken as the numeraire. The issue of output-price uncertainty, if important, would have to be modelled here as uncertainty in real wages. Some of the variants of the model, analysed further in this chapter, do include real-wage uncertainty.

[7]Note, labour in different periods, say, l_0, l_1, l_2,...l_{T-1} corresponding to different agricultural operations are considered as different inputs as in a standard static production function framework.

$$l_t^* = l_t^*(w^C , K) \ \forall \ t = 0 , 1 , 2 ,...., T-1 \tag{5}$$

where $w^C = \{w_t^C\}$ is the vector of casual wages.

(b) Next, we consider the case where total labour demand l_t in period t consists of casual labour l_t^C as well as some regular labour P[8]. Suppose resale of regular labour is possible. This means that regular labour in excess of what the employer wishes to use on his/her own farm in any period can be hired out to another farm on a casual basis. Therefore, farm maximises expected profit π_2:

$$\begin{aligned} \pi_2 &= Eg(l_0 , ... , l_{T-1} ; \theta , K) - F - \sum_{t=0}^{T-1} w_t^C(l_t - P) - \sum_{t=0}^{T-1} w^P P \\ &= \pi_1 + \sum_{t=0}^{T-1} (w_t^C - w^P) P \end{aligned} \tag{6}$$

where w^P is the imputed daily wage[9] of regular labour. In this case, an employer maximises the same profit π_1 as in case (a) plus an additional term related to the wage differential between casual and regular contracts[10]. It can immediately be seen that farm's optimal decisions will be as follows:

(i) Optimum regular demand $P = 0$ if $T w^P > \Sigma_t w_t^C$.
(ii) Optimum regular demand $P = \infty$ if $Tw^P < \Sigma_t w_t^C$
(iii) If $T w^P = \Sigma_t w_t^C$, casual and regular labour are perfect substitutes.

(c) More generally, suppose no resale of labour is possible. There may be some slack periods when all regular labour is used so that $P \leq l_t^*$ so that there is no hoarding cost attached to the maintenance of a steady pool of regular labour P even if resale is not

[8]The amount of the regular labour hired is determined at the beginning of the production period and is maintained at that level. Hence, we drop the time subscript from the regular labour component (l_t^P) of total labour demand and write $l_t^P = P$.

[9]Regular wage is considered to be the cash equivalent of cash and kind payment made to the regular labourers. As explained earlier (pp. 31), the 'imputed daily wage' of regular labourers is defined as the annual wage payment divided by the number of days in the year. This notion is used for the purpose of comparison with the daily wage of casual labourers.

[10]The model assumes no transaction costs in selling regular labour. The next model will assume that reselling is not possible at all. The case where reselling is possible but involves transaction costs can be considered as an intermediate case (this case will not be explicitly analysed here).

possible. If, however, in some slack periods t, t = 0, 1, 2,....., T-1, there is an excess supply of regular labour ($P > l_t^*$), there is a hoarding cost attached to it because these regular labourers are paid even when their productivity is low. In this case, the farm maximises the expected profit π_3:

$$\begin{aligned} \underset{l_t, P}{Max}\ . \ \pi_3 &= Eg(l_0 , l_1 , ... , l_{T-1} ; \theta , K) \\ &- F - \sum_{t=0}^{T-1} w_t^C (l_t - P) - \sum_{t=0}^{T-1} w^P P \end{aligned} \tag{7}$$

subject to the 'no-resale constraint' that $l_t \geq P$ for all t. This is, therefore, a constrained expected profit maximisation problem. The Lagrangean of this maximisation problem can be written as follows:

$$L_3(.) = Eg(l_0 , l_1 , ..., l_{T-1} ; \theta , K) - F - \sum_{t=0}^{T-1} w_t^C \, l_t^C - \sum_{t=0}^{T-1} w^P P - \sum_{t=0}^{T-1} \mu_t (P - l_t) \tag{8}$$

where μ_t is the Lagrange multiplier for the no-resale constraint in period t. Let us now define $H(l_t, P) = \Sigma_t \mu_t(P - l_t)$ to be the hoarding cost function of the farm so that the Lagrangean can also be rewritten as follows :

$$L_3(.) = Eg(l_0 , l_1 , ..., l_{T-1} ; \theta , K) - F - \sum_{t=0}^{T-1} w_t^C \, l_t^C - \sum_{t=0}^{T-1} w^P P - H(P, l_t) \tag{9}$$

H(.) can be interpreted as the 'hoarding cost' of regular labour, i.e., the cost of not being able to resell labour in periods when the marginal product of regular labour is less than the prevailing casual wage rate.

Given the inequality constraint, complementary slackness condition of the constrained expected profit maximisation problem implies the following :

$\mu_t \geq 0$ and $l_t \geq P$ with at least one equality, which, in turn, implies :

(i) If $\mu_t > 0$, $l_t = P$, i.e., no-resale constraint is binding;

(ii) If $l_t > P$, $\mu_t = 0$, i.e., no-resale constraint is not binding.

Maximisation of (8) with respect to l_t requires :

$$\mu_t = w_t^C - E(g_t) \ \forall \ t = 0 , 1 , .. , T-1 \tag{10}$$

Suppose $l_t > P$ so that $\mu_t = 0$. In that case, equation (10) shows that l_t is determined in such a way that the expected marginal product of labour in each period is equated to its marginal cost w_t^C. If, however, $\mu_t > 0$, labour demand is determined in such a way that the marginal hoarding cost of regular labour is equal to the marginal cost of casual labour (w^C_t) net of expected marginal product. From these T marginal conditions, we determine $l_t = l_t^*$, t = 0, 1, 2,....., T-1 as follows:

$$\begin{gathered} l_t^* = l_t^*(K , w^C) \ \forall \ t = 0 , 1 , 2 , \ldots , T-1 \\ \textit{where we assume } \frac{\partial l_t^*}{\partial K} > 0 \ \forall \ t = 0 , 1 , 2 , \ldots , T-1 \end{gathered} \tag{11}$$

where, as before, $w^C = \{w_t^C\}$ is the vector of casual wages.

Secondly, maximisation of (8) with respect to P requires :

$$H_P \equiv \sum_{t=0}^{T-1} \mu_t = \sum_{t=0}^{T-1} (w_t^C - w^P) = \sum_{t=0}^{T-1} w_t^C - T w^P \tag{12}$$

Let us call (12) to be the *employers' indifference condition.* This states that the difference between the wage cost of hiring a casual labour day after day and that of hiring a regular labourer over the season should be equal to the marginal hoarding cost of regular labour (which is non-negative). If this condition is satisfied, the employer is indifferent, at the margin, between hiring casual and regular labour.

For a given employer, we can now distinguish between 'surplus labour period' (when the employer would, if possible, like to resell the labour of some of his/her regular labour) and 'labour hiring periods' (when the employer hires casual labour in addition to regular labour).

[Insert figure 1 (pp. 63) here]

In surplus labour periods, $l_t = P$ and $\mu_t = w_t^C - E(g_t) \geq 0$ (which directly follows from the complementary slackness condition). In labour hiring periods, however, $l_t > P$ such that

$\mu_t = 0$ and $w_t^C = E(g_t)$. Since $\mu_t = 0$ during labour hiring periods, we can rewrite H_P as follows :

$$H_P \equiv \sum_{t\,:\,P > l_t} \mu_t \tag{13}$$

In figure 1, we measure regular labour on the horizontal axis and wage on the vertical axis. The line H_P is the marginal hoarding cost H_P (evaluated at $l_t = l_t^*$ for all t). We note that, for very small P (till the range OA), $l_t > P$ and $\mu_t = 0$ in each period (each period is 'labour hiring period') so that marginal hoarding cost of regular labour is zero. In other words, if the amount of labour which the employer wishes to employ is greater than P in each period, there is not hoarding cost. For very large P, however, $\mu_t \rightarrow w_t^C$ (because $E(g_t) \rightarrow 0$) and $H_P \rightarrow \Sigma\, w_t^C$. In other words, if P is very large, then an additional regular labourer creates a hoarding cost close to w^C_t per day (because he will be redundant most of the year). Line C'DE (which is a 'mirror-image' of the line H_P, based on (12)) refers to the regular wage such that employers' indifference condition (12) holds good.

Next, we note that, for larger farms, the curve H_P normally shifts to the right (i.e., the marginal hoarding cost of regular labour, at a given level of employment of regular labour, is typically lower for larger farms). Intuitively, larger farms have larger l_t^* for each t (as assumed earlier), and, therefore, for given P, they are more likely to hire casual labour in any period; since $\mu_t = 0$ in each hiring period, H_P will be lower for the larger farms.

We can conclude with the following propositions:

Proposition 1. Suppose, T $w^P > \Sigma_t w_t^C$, then no regular labour is hired. Farmers rely exclusively on casual labour.

Proposition 2. Suppose T $w_P < \Sigma_t w_t^C$, and that at least some regular labour is hired. The employer's indifference requires $\mu_t > 0$ for some t. Thus, for each employer, there exists at least one t such that $l_t = P$ ($l_t^C = 0$) and hoarding costs are positive (i.e., no-resale constraint is binding). This is intuitively plausible; when wage costs of regular labour are less than those of casual labour, it is never optimal for a farm to use a positive amount of casual labour in each period.

Proposition 3. The larger the farm-size, the larger is the amount of regular labour hired.

2.2. Implicit Contract Model[11]

The primary idea of the implicit contract model is that farmers are risk-neutral while workers are risk-averse[12]. Hence, farmers may enter a regular contract with the workers to insure them against the fluctuations of wage and employment over the course of the production cycle.

2.2.1. Farms

As in section 1, farms are all assumed to be identical. Suppose they are all risk-neutral, too, irrespective of the difference in the farm-size. In order to be in an implicit contract framework, we now introduce uncertainty in casual wages during slack and peak periods. Production functions (1) are retained. If resale of labour in the slack period is not possible, farms maximise the following expected profit net of harvest wages :

$$\pi = Eg(l_0 , l_1 , ..., l_{T-1} ; \theta , K) - F - \sum_{t=0}^{T-1} E(w_t^C) \, l_t^C - \sum_{t=0}^{T-1} w^P P \tag{14}$$

The earlier derivations go through with minor modifications. The employer's indifference condition (12) is modified to :

$$\sum_{t=0}^{T-1} \mu_t = \sum_{t=0}^{T-1} E(w_t^C) - T w^P \tag{15}$$

Let us define $\tilde{w}^P$ as follows :

$$\tilde{w}^P \equiv \sum_{t=0}^{T-1} \frac{E(w_t^C)}{T} \tag{16}$$

which is the average expected value of casual wage. Since $\mu_t \geq 0 \; \forall \; t$, the value of w^P at which the employers' indifference condition is satisfied is never greater than $\tilde{w}^P$.

[11]For convenience of exposition, the model presented in this section ignores discounting. However, discounting is easy to introduce, and does not affect the results, as long as employers and labourers have the same discount rate. The case where discount rates are different will be taken up in the 'collateral model'.

[12] There is a good deal of general evidence that risk-aversion decreases with increasing wealth. This also seems to apply in rural India (see Binswanger, 1993). In one experiment (Binswanger, 1977), it was found unexpectedly, that poor workers are not significantly more risk-averse than richer farmers. However, the attitudes to risk observed in these experimental situations need not be the same as those applying to real-world decisions, so that this evidence remains highly tentative.

2.2.2. Workers

Workers are all assumed to be identical and they are all risk-averse so that their utility functions are concave (U' > 0; U" < 0).

If a worker accepts a regular contract, his/her utility is:

$$U^P = U(w^P, w^P, \ldots\ldots, w^P) \tag{17}$$

If, however, s/he chooses a casual contract, his/her utility is[13]:

$$U^C = E[U(w_0^C, w_1^C, \ldots\ldots, w_{T-1}^C)] \tag{18}$$

where casual wages are assumed to be stochastic[14].

'Workers' indifference condition' is satisfied when $U^P = U^C$ or:

$$U(w^P, w^P, \ldots\ldots, w^P) = E[U(w_0^C, \ldots\ldots, w_{T-1}^C)] \tag{19}$$

Let $w^P{}_*$ be the value of w^P at which this condition is satisfied. By concavity of U, we immediately know that $w^P{}_* \leq \tilde{w}^P$.

2.2.3. Equilibrium

In equilibrium, demand for regular labour is determined by the farms' indifference condition (15) while supply by the workers' indifference condition (19). The situation is depicted in figure 2 where we plot regular wage on the vertical axis and the amount of regular labour hired on the horizontal axis.

[Insert figure 2 (pp. 64) here]

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[13] Here, as in much of the chapter, we are assuming that there are no constraint in selling labour on the casual labour market (i.e., no involuntary unemployment). The implication of involuntary unemployment for the implicit contract model will be examined in section 2.2.4. In general, involuntary unemployment raises the attractiveness of regular labour for labourers (as shown in that section in the context of implicit contract model), since regular labour involves some security of employment.

[14] For simplicity, it is assumed here that the probability of getting a casual employment is equal to unity. With this assumption, we eliminate the possibility of unemployment in the model. However, it should be borne in mind that the availability of casual employment is not certain in the rural labour markets; it is rather dependent on the agricultural season of the year and is not necessarily one. These possibilities are included in the later sections of the chapter.

Farms' demand for regular labour is derived as follows. At low values of P ($P \le \tilde{P}$), $\mu_t = 0$ ($\therefore H_P = 0$), i.e, the no-resale constraints are not binding; thereafter, the constraint becomes binding as the value of P rises. Hence, the demand curve for regular labour AA'B is first horizontal at the wage $\tilde{w}^P$ and then slopes downwards (this curve is the same as C'DE in figure 1) where $\tilde{w}^P$ is as defined earlier. The supply curve, on the other hand, is infinitely elastic at w^P_* ($< \tilde{w}^P$); this is depicted by the line CD in figure 2. There is a unique equilibrium, with regular wage w^P_* and employment level P^* (see figure 2). We conclude :

Proposition 4. For given values of $\{w^C_t\}$, there exists a unique equilibrium regular wage w^P_* such that $w^P_* < \Sigma_t\ [E(w^C_t)/T]$.

Thus, in this model casual and regular labour contracts coexist as a mutually advantageous arrangement between risk-neutral farms and risk-averse workers.

2.2.4. An extension : A Model with Unemployment

It is easy to extend the preceding model to take involuntary unemployment into account. Involuntary unemployment occurs because there may be a constraint on the workers' participation so that an individual willing to participate in the market may not be able to find one. To illustrate, consider the simple case where for casual labourers, there is a known probability ρ_t of employment in each period t such that $0 < \rho_t < 1$. Farm's demand for labour remains the same so that employer's indifference condition (15) is still ensured.

We now have to modify U^C as follows:

$$U^C = E[U(w_0^C.\rho_0\ ,\ .....,\ w_{T-1}^C.\rho_{T-1})] \tag{20}$$

Consequently, we modify workers' indifference condition in that finding a casual job is not certain. On the contrary, there is a probability ρ_t attached to the availability of casual employment in any period t. It is still the case that there exists a wage w^P at which labourers are indifferent between casual and regular contracts and that w^P_* is lower than the average expected value of the casual wage. In fact, it is intuitively obvious that the regular wage at which the labourers' indifference condition is satisfied is lower in the presence of involuntary unemployment than when there is full employment (for a given profile of casual wages).

Proposition 5. The wage at which a labourer is indifferent between casual and regular contracts is lower in the presence of unemployment; the difference accounts for the premium for employment insurance to be paid by the regular labourers.

2.2.5. Comments

In the implicit contract framework, risk-neutral farms are willing to offer wage and employment insurance to risk-averse workers. In the process, farmers pay a regular wage which is less than the casual wage per period. A labourer is willing to give up his risk-premium in order to enjoy a stable income and employment. The casual-regular wage differential can also be interpreted as the marginal hoarding cost of regular labour.

Given a highly unequal distribution of land resources in the Indian villages, there are usually a few large farmers in the village while a majority of farms are small farms. Given this distribution of small and large farms, it is expected that only a few regular farm contracts are offered while casual contracts dominate the rural labour market. Most available empirical evidence obtained from different parts of India supports the prediction.

2.3. Shirking Model

In this section, we develop a shirking model of efficiency wages. The idea is as follows: differences in the nature of tasks induce farmers to offer regular contracts to perform the tasks difficult to supervise and ensure no-shirking in these tasks.

2.3.1. Non-Substitutability

As before, the production of a particular crop is considered. The production of the crop is organised over an infinite sequence of periods, where each period can be thought of as one season, including the harvest.

The analysis in this section differs from that in section 2.2 in that it is assumed that casual labour cannot be hired to perform certain tasks, called 'non-monitorable' tasks for which neither the effort level nor the productivity level can be observed on the day of hiring. Casual labourers are exclusively hired to perform 'monitorable' tasks such as harvesting.

Suppose each period involve tasks like soil preparation, tilling, irrigation, application of fertilizer, transplanting, weeding and harvesting. Some of these tasks like soil preparation, tilling, irrigation, application of fertilizer are difficult to supervise. For example, it is difficult to supervise how deep the blade has gone while tilling or whether the water flow into the field has properly been controlled while irrigating. Moreover, these are tasks which need considerable care and judgement. Hence, quality control is also important in these tasks. The latter is particularly important because the fruits of these tasks are realized only after the harvests. These tasks are called 'non-monitorable' tasks[15].

Tasks like harvesting, however, are easy to supervise. Moreover, given the simpler nature of these tasks and easier supervision, quality control is relatively easy, too; these are termed as the 'monitorable' tasks[16].

Employers hire regular labour to perform non-monitorable tasks. In a non-monitorable task, it is assumed that the labourer may or may not shirk. If the labourer shirks, it is assumed that he is caught and will be dismissed at the end of the period. Casual labourers are hired to perform monitorable tasks. The resulting outcome may be the coexistence of casual and regular contracts in equilibrium.

Given the problem of supervision, an employer may not be able to observe the actual effort level of the workers in non-monitorable tasks. Consequently, a regular labourer hired to perform these tasks may be tempted to shirk in these tasks (i.e., s/he may not offer the required effort level). To overcome this problem, an employer may use certain effort-augmenting schemes (see, Shapiro and Stiglitz, 1984) to discipline labourers so that labourers, in their own best interests, take the actions that the employer wants them to do. The effort-augmenting scheme, in the model presented below, consists of offering a sufficiently high wage to regular labourers so that it is in their interest to avoid being fired.

2.3.2. Farms

On the employers' side casual and regular labour are regarded as non-substitutable inputs in the production function since they perform different tasks. We consider an infinite sequence[17] of periods where each period can be thought of as one season. Since P and l_t^C

[15]These tasks correspond to 'Type I' tasks in Eswaran & Kotwal (1985a).

[16]The distinction between these two types of task is closely related to the nature of the crop produced. For example, it is important to know whether the crop is irrigated or not. Irrigation is one major task where supervision is difficult and which is required at regular intervals throughout the growing season of the particular crop in question. It has also been found that usually regular farm servants are hired by large farmers in the production of irrigated crops.

[17]With a finite horizon, regular labourers always have an incentive to shirk during the last period; so the employers should fire them at the end of last-but-one period; but then labourers will have an incentive to shirk during the last-but-one period and so on. By recursion, the incentive mechanism breaks down if we have finite horizon. Hence, we concern ourselves with an infinite production sequence.

are not substitutable, we modify the production function of section 2.1. In this case, output *net of harvest wages* is given as follows.

$$Q^{t} = h(P\ ,\ l_t^{C}\ ;\ \theta^{t}\ ,\ K) \tag{21}$$

where as before P is the amount of regular labour hired and l_t^C is the input of casual labour in period t. As before h(.) is the level of output net of harvest wages where h(.) is assumed to be concave, continuous and twice differentiable in its inputs. θ^t is the uncertainty parameter in period t.

Farms are all assumed to be identical. They maximise the following expected profit:

$$\underset{P\ ,\ l_t^C}{Max}\ \pi_4 = \sum_{t=0} \delta^t\ E[h(P\ ,\ l_t^C\ ;\ \theta^t\ ,\ K)] - \sum_{t=0} \delta^t\ [F + w_t^C\ l_t^C + w^P\ P] \tag{22}$$

Here w^P is the regular wage per period and w^C_t is the casual wage in period t (not stochastic), and δ is the employers' rate of discount. Price per unit of output is normalized to unity. Profit maximisation with respect to P requires the fulfilment of the following condition :

$$w^{P} = \left[\frac{\sum_{t=0} \delta^t\ E(h^{P})}{\sum_{t=0} \delta^t}\right] = MP_P \tag{23}$$

where MP_P can be interpreted as the average expected marginal product of regular labour.

Secondly, profit maximisation with respect to l^C_t in each period t requires the following:

$$w_t^{C} = E(h_t^{C})\ \forall\ t = 0\ ,\ 1\ ,\ 2\ ,... \tag{24}$$

Given the problem of supervision in the non-monitorable tasks, w^P needs to be large enough to ensure that regular labourers do not shirk. This takes us to the next section where we consider workers' behaviour.

2.3.3. Workers

Workers are all assumed to be identical; they all dislike putting in effort (e), but enjoy consuming goods. It is further assumed that each worker either offers a zero level of effort ($e = 0$) or some fixed positive level of effort $e = \bar{e} > 0$ in agricultural production[18]. There are non-monitorable and monitorable tasks to be performed. Efficient performance of any task requires $\bar{e} > 0$.

If a labourer chooses a regular contract, s/he receives a series of incomes (w^P, w^P,.....) per period in return for an effort level e. If, however, a casual contract is chosen, the stream of income is (w^C_0, w^C_1,....). The point of difference between casual and regular contracts, aside from the wage level, is that a labourer may shirk in the regular contract (offered to perform the non-monitorable tasks), but it is not possible to shirk in the casual contract for monitorable tasks.

Suppose the single-period utility function for an individual worker (with casual or regular contract) is given by :

$$u^j = u^j(w^j \ , e) \tag{25}$$

where w^j refers to the wage income of the j-th type contract, j = P, C accordingly as the worker is hired on a regular (indexed by P) or on a casual (indexed by C) basis, respectively. Let us further assume that the utility is separable. Then with suitable normalization, following Shapiro and Stiglitz (1984), we may write the multi-period utility functions in the following forms[19] :

$$\begin{aligned} u^P &= u^P \left(w^P - e \ , w^P - e \ , \ ....\right) \\ u^C &= u^C \left(w_0^C - e \ , w_1^C - e \ , \ ....\right) \end{aligned} \tag{26}$$

Suppose the value of indirect utility (maximum utility to be derived subject to the budget constraint) for regular and casual workers are V_P and V_C respectively where V_C is simply as follows:

$$V_C = u^C(w_0^C - e, \ w_1^C - e, \ .....) \tag{27}$$

[18]More generally, it can easily be extended to the case where the required amount of effort level in each task e_t performed in period t is dependent on the particular task performed in period t.

[19]We assume that w^P and e are both measured in money terms. This will enable us to write down the no-shirking condition explicitly in terms of the wage differential between casual and regular contracts.

Given the problem of supervision in non-monitorable tasks, a regular labourer may or may not shirk. Assuming δ to be the rate of discount for the labourers as well, the indirect *utility of a non-shirker* in regular employment will be :

$$\begin{aligned} V_P^N &= (w^P - e) + \delta(w^P - e) + \delta^2(w^P - e) + \ldots \\ &= \frac{1}{1-\delta}(w^P - e) \; ; \; 0 < \delta < 1 \end{aligned} \tag{28}$$

Next, consider the case of a shirker in regular employment. We suppose that if someone shirks in any of the slack periods, say, (K - 1)-th period, s/he will be caught and fired at the end of that period. Hence, the discounted *utility of a shirker* in regular employment who decides to shirk in period (K - 1) will be given by:

$$\begin{aligned} V_P^S &= \left[(w^P - e) + \delta\,(w^P - e) + \delta^2\,(w^P - e) + \ldots + \delta^{K-2}\,(w^P - e)\right] \\ &\quad + \delta^{K-1} w^P + \left[\delta^K\, V_{OP} + \delta^{K+1}\, V_{OP} + \ldots\right] \\ &= (w^P - e)\frac{1-\delta^{K-1}}{1-\delta} + \delta^{K-1} w^P + \delta^K \frac{1}{1-\delta} V_{OP} \end{aligned} \tag{29}$$

where V_{OP} is the indirect utility derived from outside the regular employment.

It is easy to show that, it is in the interest of a regular labourer to shirk (and loose his/her job) in period K - 1, then it is even better for him/her to shirk in the preceding period, K - 2. By recursion, if a labourer shirks at all, it will be in the first period. Further it will be in the labourer's interest to shirk in the first period, rather than not to shirk at all, if and only if the following condition is satisfied:

$$e > \delta(w^P - V_{OP}) \tag{30}$$

This condition has a straightforward intuitive interpretation. The left-hand side can be interpreted as the cost of postponing shirking by one period. The right-hand side is the benefit, in terms of additional utility (w^P - V_{OP}) in the following period. If the cost is higher than the benefit, then the labourer decides not to postpone shirking, i.e., the labourer shirks.

It follows that, if the employers want to ensure that labourers do not shirk, they have to offer a wage w^P at least equal to w^P_*, where

This is the no-shirking condition.

$$w_*^P \equiv V_{OP} + \frac{e}{\delta} \tag{31}$$

To illustrate, consider the case where the casual labour market is competitive, so that $w_t^C = e$ for all t and there is no involuntary unemployment. Then it can be assumed that a fired regular labourer simply joins the casual labour market when V_{OP} is as follows:

$$V_{OP} = w_t^C - e = 0 \tag{32}$$

Hence, the no-shirking condition is modified to:

$$w_*^P = \frac{e}{\delta} = \frac{w_t^C}{\delta} \tag{33}$$

Since $0 < \delta < 1$, the last equation implies that regular labourers receive higher wages than casual labourers.

2.3.4. Equilibrium

The equilibrium of the model is characterised as follows. We assume that the casual labour market is competitive, so that there is no involuntary unemployment and the wage rate for casual labour in each period is determined by supply and demand. The wage rate for regular labour, on the other hand, is derived from the no-shirking condition, as described in the preceding section. Given this wage rate, employers employ regular labour up to the point where wage equals marginal product (see equation (23)).

In terms of comparative statics, we can say that anything which leads to an increase in V_{OP} (e.g., a tightening of the casual labour market leading to an increase in casual wages) will lead to an increase in regular wages, since employers will have to pay a higher wage in order to satisfy the no-shirking condition.

2.3.5. Comments

In this shirking model, differences in the nature of tasks generate a differentiation of labour contracts. In particular, it is argued that farms prefer to hire regular labour to perform non-monitorable tasks. In order for this to be feasible, employers have to pay a regular wage sufficiently high that the no-shirking condition is satisfied. With a competitive casual labour market, this condition requires regular wages per period to be higher than casual wages.

Agarwal (1981) has observed that in the highly advanced area of Punjab, the primary function of regular farm servants is to help with irrigation. Binswanger et al. (1984) find that most regular farm servants in a number of south-Indian villages are involved in ploughing, a non-monitorable task. However, other studies (e.g., see, Breman, 1974; Bhalla, 1976; Bardhan & Rudra, 1981; Rudra, 1982b) report that regular farm servants are supposed to perform most agricultural tasks (as well as some non-agricultural tasks such as looking after the livestock, driving bullock carts or carrying harvests to the market, especially in the slack seasons when there is a low demand for labour). Thus, the basis of task-based differentiation of labour contracts may be rather weak. In chapter five, we shall attempt to test the hypothesis of task-based segmentation in the villages studied in the dissertation.

2.4. Collateral Model

Rural credit markets are segmented between formal and informal sectors (Binswanger et al., 1985). Formal credit is cheaper, but it requires collateral to be offered. Usually, land is the most acceptable form of collateral and landless households are unable to offer this collateral. Hence, they primarily borrow from the informal credit market where the marginal cost of credit is much higher. In this context, regular contracts can play a useful role of collateral substitute.

Casual labourers are usually paid daily. However, a major portion of regular wages are paid in advance when the contract begins. The amount of this advance is free of interest. Only if the amount of the advance exceeds the amount of total wage, an interest is charged on the additional amount which constitutes the loan. Thus, regular labour contracts with interest-free advance (credit) payment may solve the problem of credit access for the landless labourers where the labour contract with the employer substitutes for the collateral requirement.

2.4.1. Farms

Let us now go back to the original model as presented in section 2.1.2 where there is no production uncertainty in the slack periods, though there is uncertainty in the peak period. We also assume that casual wages are given exogenously. Production is organised over several slack and peak periods, t = 0, 1,..., T. Output and, therefore, profit are realized at the end of period T so that (1) remains the relevant production function.

Let r be the interest rate (i.e., discount rate) of the employers, W^P the regular wage, fully paid in advance and w_t^C the casual wage in current value in period t. Farms maximise the following *expected present discounted value of profits* realized in period T net of harvest wages :

$$\begin{aligned}\pi_5 &= s_t\, E(Q) - F - \sum_{t=0}^{T-1} s_t\, w_t^{\,C}\, l_t^{\,C} - W^P P \\ &= s_t\, E[g(l_0\,,\, l_1\,,\,..\,,\, l_{T-1}\,;\,\theta\,,\,K)] - F - \sum_{t=0}^{T-1} s_t w_t^{\,C}\,[l_t - P] - W^P P\end{aligned} \tag{34}$$

subject to the no-resale constraint that $l_t \geq P$ for all t. In (34), s_t is the discount factor for period t, i.e., $s_t \equiv (1 + r)^{-t}$. Hence, the Lagrangean of this constrained expected profit maximisation is :

$$\begin{aligned}L_5(.) &= s_t\, E\big[g(l_0\,,\, l_1\,,\,..\,,\, l_{T-1}\,;\,\theta\,,\,K)\big] - F \\ &- \sum_{t=0}^{T-1} s_t w_t^{\,C}\,[l_t - P] - W^P P - \sum_{t=0}^{T-1} \mu_t\,(P - l_t)\end{aligned} \tag{35}$$

where μ_t is the Lagrange multiplier for the no-resale constraint in period t.

Differentiating the Lagrangean (35) with respect to l_t, we obtain:

$$s_t\, E(g_t) - s_t\, w_t^{\,C} + \mu_t = 0 \;\forall\; t = 0\,,\, 1\,,...,\, T{-}1 \tag{36}$$

where as before g_t is the partial derivative of g(.) with respect to l_t.

For the labour hiring periods,

$$\mu_t = 0 \text{ so that } s_t\,.\,E(g_t) = s_t\,.\,w_t^{\,C} \tag{37}$$

However, for the labour surplus periods,

$$\mu_t = s_t\,.\,w_t^{\,C} - s_t\,.\,E(g_t) \geq 0\;;\; l_t = P \tag{38}$$

Equations (37) and (38) determine labour demand l_t^* in each period t as follows:

$$l_t^* = l_t^*(w^C, r, K) \ \forall \ t = 0, 1, 2, \ldots, T-1 \tag{39}$$

where $w^C = \{w^C_t\}$ is the vector of casual wages.

Differentiating (35) with respect to P, we obtain the following :

$$\frac{\partial \pi_s}{\partial P} = \sum_{t=0}^{T-1} s_t \, w_t^C - W^P - \sum_{t:P>l_t} \mu_t \tag{40}$$

where (40) is the modified indifference condition of employers.

Let $\tilde{w}$ be the value of W^P at which the employers' indifference condition is satisfied, i.e., the right-hand side of (40) is zero. We can immediately derive :

$$\tilde{w} \equiv \sum_{t=0}^{T-1} s_t \, w_t^C - \sum_{t:P>l_t} \mu_t \tag{41}$$

2.4.2. Workers

Workers are all assumed to be identical with a discount rate δ (which is also the interest rate faced by them) where workers' discount rate δ is assumed to be higher than that (r) of employers (i.e., $\delta > r$). This is because labourers have access to a different segment of the rural credit market. Labourers may choose a regular or a casual contract. Regular labourers receive W^P at the beginning of the contract period. However, casual labourers receive w_t^C per period so that the present discounted value of the stream of casual income earned over T periods is $W^C = \Sigma_t \, u^t \, . \, w_t^C$ where $u_t = (1 + \delta)^{-t}$. If we now approximate utility derived from any contract by the stream of income earned net of harvest wages from the respective contract (this ignores risk-aversion, but it is easy to extend the results to take risk-aversion into account), we have:

$$U^P = W^P$$
$$U^C = W^C = \sum_{t=0}^{T-1} u_t \, w_t^C \qquad (42)$$

Suppose w_* be the regular wage at which workers are indifferent between casual and regular labour contracts. From (42), we have:

$$w_* = \sum_{t=0}^{T-1} u_t \, w_t^C \qquad (43)$$

2.4.3. Equilibrium

The Equilibrium is depicted in figure 3, where employment of regular labour is measured on the horizontal axis and the regular wage (paid in advance) on the vertical axis. Suppose casual wages are given exogenously. Then there exists a regular wage rate $W^P = w_*$ such that workers' indifference condition holds good. On the other hand, employer's indifference condition requires that at $W^P = \tilde{w}$, (41) holds good.

[Insert figure 3 (pp. 65) here]

Further, it is clear that, for small values of P (implying $\mu_t = 0 \; \forall \; t$), $\tilde{w}$ is larger than w_*, since $s_t > u_t$ for all t. However, as P increases beyond $\tilde{P}$, $\mu_t > 0$ and labour demand declines accordingly. WW' is the labour supply curve (derived from workers' indifference condition). Much as in section 2.2, we have shown that there is a unique equilibrium, with $W^P = w_*$ and $P = P^*$, involving coexistence of casual and regular contracts.

2.4.4. An Extension : Partial Advance Model

So far we have assumed that the total regular wage is paid in advance. Let us now consider the case where regular labourers receive a partial advance 'A' in the beginning of the production period and then a wage w^P each period.

Proposition 7. If $\delta > r$, employers prefer to pay regular wages in advance.

Under a partial advance scheme, workers' indifference condition (43) is modified to the following:

$$A + \sum_{t=0}^{T-1} u_t\left[w_*^{PA} - w_t^{C}\right] = 0 \tag{44}$$

where w^{PA}_* is the regular wage per period in current value at which a worker is indifferent between casual and regular contracts and u_t is the workers' discount factor ($u_t = (1 + \delta)^{-t}$).

Similarly, employers' indifference condition (41) is modified to the following :

$$A + \sum_{t=0}^{T-1} s_t\, \tilde{w}^{PA} = \sum_{t=0}^{T-1} s_t\, w_t^{C} - \sum_{t\,:\,P>l_t} \mu_t \tag{45}$$

where $w^P = \tilde{w}^{PA}$ is the wage rate at which employers' indifference is ensured and s_t is the employers' discount factor ($s_t = (1 + r)^{-t}$).

It can be seen from workers' and employers' indifference conditions that under the partial advance scheme there is an inverse relationship between advance component 'A' and wage component w^P so that as w^P increases, the amount of 'A' to be paid declines. Given that $\delta > r$, $s_t > u_t$, this means that the absolute marginal decrease in w^P due to an increase in 'A' is higher for farmers (i.e., absolute slope of employer's indifference curve) than that for labourers (i.e., absolute slope of labourer's indifference curve). Hence, employers would prefer to increase the amount of advance until the point is reached when the total regular wage is paid in advance.

[Insert figure 4 (pp. 66) here]

This is shown in figure 4 where we plot advance 'A' on the horizontal axis and regular wage w^P per period on the vertical axis. AB is the worker's indifference curve (whose absolute slope is $u_t = 1/(1+\delta)^t$) and A'B' is the employer's indifference curve (whose absolute slope is $s_t = 1/(1+r)^t$) where $\delta > r$. Since $s_t > u_t$, A'B' is flatter than AB. (A_0, w^P_0) is the combination of advance and wage payment which is as good for employers as for labourers. However, it can be seen from the figure that there exists an advance $A' > A_0$ and a wage $w^{P'} < w^P_0$ (in the dotted area) which is strictly preferred by the employers.

2.4.5. Comments

If the entire regular wage is paid in advance, the labourer may have the incentive to shirk without being worried to lose the wage payment per period since the payment for the contract period has already been made. If, however, employers have the problems to monitor labourers, a partial advance model may have the advantage in disciplining regular labourers. Empirical evidence suggests that in most cases a substantial portion of regular wage is paid in advance, the rest in several instalments (see further discussion in chapter four).

2.5. Time Constraint Model

The ownership of family land and/or non-land resources may impose a *time constraint* on the individual's ability to offer labour-time in the market. Our final argument is related to a comparison of landed and landless labourers with respect to the labour time available for sale in the market. For example, a landed labourer needs to work on the family farm; members of households with some caste-occupations like toddy-tapping, stone-cutting, weaving, carpentry etc. may be required to devote some labour time in these family activities. In other words, under certain circumstances, a labourer may not be able to offer his entire non-leisure time in the market[20].

2.5.1. Farms

As in section 2.1, assume that the production is organised by identical farms over a finite number of slack and peak periods. Farmers employ labour over different slack and peak periods such that marginal products are equal to respective wages. The basic model of section 2.1 is retained so far as farms are concerned. The difference is that here we introduce a discount factor. Employers' indifference condition (12) is, therefore, modified to the following:

[20]Basant (1984) points out that 'the labourer's choice between attached and casual contracts may also be restricted for reasons other than his preferences'. Atkinson (1983) also argues that the family background has a significant effect on the occupational choice in the labour market.

$$\sum_{t:P>l_t} \mu_t = \sum_{t=0}^{T-1} u_t (w_t^C - w^P) \tag{46}$$

where $u_t = (1 + \delta)^{-t}$ is the employers' discount factor, δ being their discount rate. In order to consider the nature of workers' time constraint, we move on to the next section.

2.5.2. Workers

Suppose the potential labourers in the market are differentiated with respect to family landholding. We also assume that there are only two types of labourers available in the market, those who belong to the 'landed' households and those who belong to the 'landless' households. The choice of a contract will be determined by the relative net gain to be derived from each contract subject to the time constraint.

Suppose that one unit of labour time is available in any period t, and is allocated between casual labour (E^C_t[21]) and other activities ($1 - E_t^C$) in period t, t = 0,1,2,...,T-1[22]. Suppose a regular job requires one to offer the whole of one's labour time in the market while a casual job requires $E_t^C \leq 1$. In return, a regular job offers a stream of income $\{w^P,...,w^P\}$ while a casual job offers $\{w^C_0, w^C_1,...,w^C_{T-1}\}$ with a probability ρ_t of getting a casual job in any period t.

A landless labourer is in a position to offer his entire labour time in the regular market in return for a wage payment w^P per period. However, a landed labourer may devote labour time to casual labour and reserve E^f_t to be devoted to the family farm in period t ($E_t^C + E_t^f \leq 1$). Suppose s/he receives a share of family farm output, ($w^f_t \cdot E^f_t$) if he devotes time E_t^f on family farming and earns ($w_t^C \cdot E_t^C$) with a probability ρ_t from casual labour.

Let us now compare the net rate of return accruing to a *landed labourer* from regular and casual contracts. If a landed labourer chooses a regular contract, s/he receives Y^{LP} while he receives Y^{LC} from a casual contract.

[21] It is assumed here that each individual enjoys a constant amount of leisure time in each period.

[22] As explained in section 2.1, we focus only on the slack periods 0,1,...,T-1. This is because we assume that in the peak period both casual and regular labourers receive a share of the harvests.

$$Y^{LP} = \sum_{t=0}^{T-1} u_t w^P$$
$$Y^{LC} = \sum_{t=0}^{T-1} u_t[\rho_t\, w_t^C \,.\, E_t^C + w_t^f \,.\, E_t^f] \tag{47}$$

where u_t is the workers' discount factor ($u_t = (1 + \delta)^{-t}$) as in section 2.4.2, δ being the workers' discount rate in period t)[23]. Suppose there exists a wage $w^P = w^{PL}$ per period such that a landed labourer is indifferent between casual and regular contracts, which in turn, requires the following:

$$w^{PL} = \frac{\sum_{t=0}^{T-1} u_t[\rho_t \,.\, w_t^C \,.\, E_t^C + w_t^f \,.\, E_t^f]}{\sum_{t=0}^{T-1} u_t} \tag{48}$$

Next we consider the net rates of return, Y^{NP} and Y^{NC}, accruing to a *landless labourer* from regular and casual contracts respectively.

$$Y^{NP} = \sum_{t=0}^{T-1} u_t\, w^P$$
$$Y^{NC} = \sum_{t=0}^{T-1} u_t \,.\, \rho_t \,.\, w_t^C \tag{49}$$

If $w^P = w^{PN}$ per period t is the regular wage at which a landless labourer is indifferent between casual and regular contacts, the following holds good :

$$w^{PN} = \frac{\sum_{t=0}^{T-1} u_t \,.\, \rho_t \,.\, w_t^C}{\sum_{t=0}^{T-1} u_t} \tag{50}$$

Remembering that $E_t^C + E_t^f = 1$, (48) and (50) immediately imply the following:

[23]Note that here we assume that workers' discount rate is the same as that of the employers.

Proposition 8. $w^{PN} \leq w^{PL}$ if and only if $w^f_t \geq \rho_t \cdot w^C_t$.

More precisely,

$$w^{PL} - w^{PN} = \frac{\sum_{t=0}^{T-1} u_t (w_t^f - \rho_t w_t^C) E_t^f}{\sum_{t=0}^{T-1} u_t} \qquad \forall\ t = 0\ ,\ 1\ ,\ 2\ ,...,\ T\text{-}1 \qquad \textbf{(51)}$$
$$\Rightarrow w^{PL} \geq w^{PN} \quad \textit{iff} \quad w_t^f \geq \rho_t\, w_t^C$$

It follows that given the initial resource distribution, the opportunity cost of precommitting time in regular contract is higher for landed labourers, if and only if the opportunity income of landed labourers from family farming per period is higher than the expected earnings of a landless labourer from casual employment when both devote the same labour time E_t^f. Under the circumstances, *landless labourers will have a comparative advantage in regular jobs.*

We can extend the same logic to argue that if the labourer has some alternative non-farm employment opportunities like stone-cutting, weaving, sheep-grazing etc., in the family or elsewhere, s/he will have a higher reservation wage for regular labour than the one without these opportunities. In other words, labourers with the alternative employment opportunities (in the family or outside) will have a higher opportunity cost of precommitting time for regular jobs than those without. Hence, labourers without many alternative opportunities are more likely to be employed in the regular farm jobs simply because they are able to offer regular labour for a lower wage.

2.5.3. An Extension : Collateral Model with Time Constraints

Both the 'time constraint model' and the 'collateral model' suggest that, it is more attractive for landless labourers to choose regular contracts. Time constraint model argues that the opportunity cost of precommitting time is lower for landless labourers while collateral model argues that the marginal cost of credit is higher for landless labourers. In this section, we shall combine these arguments to establish that the choice of regular contracts by the poorer landless labourers not only satisfies the credit constraint in a segmented credit market, but also the time constraint. In doing so, we shall not only distinguish between farms and labourers, but also between landless and landed labourers with respect to their marginal cost of credit and opportunity cost of time.

As in the collateral model of section 2.4.1, we assume that the whole of regular wage W^P is paid in advance in the beginning of the period while casual wage w_t^C is paid per period t. The analysis of farms will be similar to that done in section 2.4.1 so that farm's indifference requires the following :

$$\sum_{t : P > l_t} \mu_t = \sum_{t=0}^{T-1} s_t \cdot w_t^C - W^P \tag{52}$$

where, as before, s_t is the employers' discount factor.

Next we consider labourers. We distinguish between landless and landed workers with respect to their discount rates and the allocation of available time among alternative activities.

Let δ_N and δ_L be the discount rates (i.e., interest rates) of landless and landed labourers respectively such that the following inequality holds good:

$$\delta_N > \delta_L > r \tag{53}$$

In the light of relative land distribution in rural India, we can justify inequality (53). It is reasonable to assume that employers own more land than landed labourers. Following Patnaik (1976), employers and landed labourers may be classified according to family land-labour ratio. Compared to landed labourers, employers have more land and, therefore, a higher land-labour (family labour) ratio so that they need to *hire-in* labour from the market to meet total labour demand. This means that landed labourers have a lower land-labour ratio so that their family earnings are not sufficient for survival. Landed labourers, may therefore, *hire-out* some labour-time in the market. Nevertheless, by virtue of their landownership, landed labourers are able to obtain some credit, though may not be to the same extent as that of an employer with larger land assets. In other words, the credit constraint is not at all binding for employers (because they have enough collateral to offer in the market), though it is so, at least to some extent, for landed labourers. However, due to their inability to offer land as collateral, landless labourers are not *at all* able to borrow from the formal credit market so that their discount rates are even higher than landed labourers.

Secondly, as already explained in the time constraint model, landed labourer may devote his/her time in the market as well as in the family farm. However, a landless labourer's only option is to earn from market participation.

Taking account of both the time and credit constraints, the indifference conditions of landed and landless labourers can be modified as follows:

$$\begin{aligned} Landless &: W_N^{PB} = \sum_{t=0}^{T-1} \rho_t \,.\, u_t^N \,.\, w_t^C \\ Landed &: W_L^{PB} = \sum_{t=0}^{T-1} u_t^L \left[\rho_t \,.\, w_t^C \,.\, E_t^C + w_t^f \,.\, E_t^f\right] \end{aligned} \tag{54}$$

where $u_t^L = (1 + \delta_L)^{-t}$ and $u_t^N = (1 + \delta_N)^{-t}$ are the discount factors of landed and landless labourers respectively such that $u_t^L > u_t^N$. In (54), $W^{PB}{}_N$ and $W^{PB}{}_L$ are the regular wages (fully paid in advance) at which respectively landless and landed labourers are indifferent between casual and regular contracts. Definition of other variables are as before: ρ_t is the probability of finding an alternative casual employment in period t, E_t^C, E_t^f are the time available for casual employment and family farming such that $E_t^C + E_t^f \leq 1$.

A comparison between $W^{PB}{}_N$ and $W^{PB}{}_L$ gives rise to the following expression :

$$\begin{aligned} W_L^{PB} - W_N^{PB} &= \sum_{t=0}^{T-1} [u_t^L \,.\, \rho_t \,.\, w_t^C .\, E_t^C + u_t^L \,.\, w_t^f \,.\, E_t^f - u_t^N \,.\, \rho_t \,.\, w_t^C] \\ &= \sum_{t=0}^{T-1} \left[\rho_t \,.\, w_t^C \,.\, E_t^C(u_t^L - u_t^N) + E_t^f(u_t^L \,.\, w_t^f - u_t^N \,.\, \rho_t \,.\, w_t^C)\right] \end{aligned} \tag{55}$$

assuming $E_t^C + E_t^f = 1$.

If, however, $\delta_N = \delta_L = \delta$, $u_t^L = u_t^N = u_t$, (55) is modified to the following:

$$W_L^{PB} - W_N^{PB} = \left[\sum_{t=0}^{T-1} u_t \,(w_t^f - \rho_t \,.\, w_t^C)\, E_t^f\right] \tag{56}$$

A comparison between (55) and (56) shows how with the assumption that $\delta_N = \delta_L$ (i.e., there is no constraint on credit), the first term on the right hand side of (55) vanishes and equation (56) becomes comparable to (51) which, too, does not have the term relating to the cost of credit.

Let us now analyse equation (55) which is more general than (56). Given $\delta_N > \delta_L > 0$ (where ρ_t, $E_t^C > 0$), $u_t^L > u_t^N$. The first term on the right hand side of (55) is, therefore, always positive. This term reflects the differential effect of credit constraint between landed and landless labourers. Given a higher marginal cost of credit (i.e., higher discount rate) of landless labourers, present discounted value of expected casual earnings is higher for landed labourers if both landed and landless labourers devote the same time in the casual market. Depending on the opportunity employment prospects open to landed and landless labourers, the second term on the right hand side of (55) can either be positive or negative. Here $(u_t^L.w_t^f)$ is the present discounted value of income a landed labourer receives from family farming while $(u_t^N.\rho_t.\ w_t^C)$ is the present discounted value of income a landless labourer expects to earn from casual jobs, if both devote the same labour time, namely, E_t^f. In other words, the second term of (55) captures the differential income effect of available alternative employment opportunities accruing to landed and landless labourers. Depending on the sign and magnitude of the second term of (55), the following cases may arise:

(a) The second term is positive, if $w_t^f > \rho_t\ (u^N_t/u^L_t)\ w_t^C$. In other words, if the present discounted value of income earned by a landed labourer from the family farming is higher than the present discounted value of expected income a landless labourer earns from casual employment (when both devote the same labour time) per period, left hand side of (55) is positive.

(b) If, however, $w_t^f < \rho_t\ .\ (u^N_t/u^L_t)\ .\ w_t^C$ for all t (i.e., when the second term is negative), total effect of time and credit constraints (sum total of the two terms on the right hand side of (55)) may still be positive, if and only if the first term on the right hand side of (55) is sufficiently large, i.e., if and only if the present discounted value of casual wages is sufficiently greater for landed labourers.

(c) If, on the other hand, the negative effect of the second term (i.e., present discounted value of expected income of a landless labourer from casual employment is higher than that earned by a landed labourer from the family farming when both devote E_t^f labour time) is greater than the positive effect of the first, left hand side of (55) will be negative. It is, however, unlikely that the negative effect of the second term would be so large so as to outweigh the positive effect of the first term.

In both cases (a) and (b), the cost of precommitting labour time in regular jobs is higher for landed labourers. In other words, regular contracts with wage advance are likely to be particularly attractive to landless labourers, given their higher marginal cost of credit and lower opportunity cost of time.

Conclusion

Rural labour markets in India are diverse and complex. Empirical evidence suggests different stylised facts. Different models focus on different aspects of these labour markets. However, a general equilibrium model of contractual choice explaining all the stylised facts, is yet to be developed.

The chapter introduces a general theoretical model to explain the choice of casual and regular contracts in Indian agriculture. The central theme here is to identify the seasonality of agricultural production and to introduce the concept of 'hoarding costs' of maintaining a steady pool of regular labour. Subsequently, the general model is modified to incorporate the arguments of the implicit contract model, shirking model, collateral model and the time constraint model so as to explain different stylised facts (see chapter one).

As mentioned in the review of literature in chapter 1, there is a group of models labelled as 'nutrition-based efficiency wage models' (e.g., see Guha, 1989; Dasgupta, 1993a, 1993b). These models argue that higher wages raise productivity. However, employers are able to reap the benefits of higher efficiency only at a later date. This is because the effects of higher wages on strength and energy of the workers would be felt after weeks and not within a day or two. What it means is that employers would have the incentive to pay higher efficiency wages only to regular labourers working on a longer term basis.

A number of shortcomings of the nutrition-productivity argument may be cited for the exclusion of these models:

(i) Empirical studies find that earnings from regular labour are lower than earnings from casual labour, even after taking into account involuntary unemployment in the casual labour market (see our discussion in chapter four). This raises doubt as to the validity of the nutrition argument (which requires daily regular wages are higher) in explaining labour market phenomena in India.

(ii) Bardhan (1984a) finds that regular wages respond to the changes in the demand and productivity conditions which contradicts the nutrition-based efficiency wage argument.

Dasgupta (1993a) attempts to redress these and other criticisms. In chapter 16 of his book, he has developed a two-period model where production is organised over the slack and peak periods to establish the coexistence of casual and regular contracts in the village labour market. In his framework, peak period's productivity is a function of consumption in these two periods and productivity in the peak period is positive if consumption is greater than the maintenance requirement in the peak period. Workers' reservation wage depends not only on their family landholdings, but also on the earnings from the village common property resources. The level of nutrition from the commons is a positive function of the quality of the commons and a negative function of the number of people living on it. Marginal increase in the productivity of the commons or a decrease in the size of the population, therefore, leads to an increase in casual wages. He, therefore, argues that in any cross-section of villages those possessing a richer stock of common property resources per person during the slack seasons are the ones that would be expected to sustain higher casual wages during the busy season.

In addition to the shortcomings already mentioned, two major weaknesses of the two-period model are:

(a) He argues that mobility costs are so high in the village economy that migration of labour from the less prosperous village to the more prosperous ones are absent which, to some extent, contradicts Mukhopadhyay (1987). Mukhopadhyay has, in fact, argued that long-distance migration is more common in the Indian villages so that cost/distance seems to be a less deterrent (see discussion in chapter four). This contradicts his assumption that population density is geographically uniform.

(b) Even if we assume away migration, birth rate or morbidity rate of labourers living on the commons may have significant effect in equalising wages across villages in this two-period model. It may be argued that given higher nutrition in the villages with more earnings from the commons, death rates are lower as compared to those with less income from the commons. Thus, in the long run through the process of natural selection, wages may be equalised.

Bliss and Stern (1978) find 'the incidence (of permanent contracts) does seem very much less than would be predicted by the theory, for many parts of India and, certainly in the part of West U.P., where we were working'. If the wage-productivity relationship is strong enough, it should be universal. But only a minority of labour contracts in different parts of India are of regular variety[24], the majority being of casual nature. In view of all these evidences, we abstain from incorporating this nutrition-productivity nexus into our analysis.

However, during my field surveys, I have noticed that there is a general consideration among farmers to discipline labourers so as to minimise shirking. This has been unanimously supported in our interviews. The idea is captured in the 'shirking model' where we argue that employment of regular labour in certain tasks help employers to induce the required effort

[24]Using 27th round NSS data, Bardhan (1984a) finds that only 18% of total labourers can be labelled as the regular or attached labourers.

has been used. Empirical evidence may show that daily regular wages are lower than daily casual wages (see chapter four); but the additional facilities (credit, bonus/gift etc.) offered in the regular contract may play a significant role to discipline regular labourers, especially when these additional facilities are otherwise difficult to obtain. We shall consider the empirical validity of the argument in chapters four and five.

In modelling the rural contractual arrangements, usually the farms' demand for labour has been emphasized which ignores the workers' preference pattern. The implicit contract model with hoarding costs and the shirking model have been developed here in this tradition. Nevertheless, there is growing evidence of the strength of the labour supply in determining the nature of contractual arrangements in rural India (Basant, 1984; Walker and Ryan, 1990). The 'collateral model' and the 'time constraint model' may throw some light in this regard. The analysis shows how given risk-aversion, time constraint and credit constraint of workers, the comparative advantage of risk-averse landless labourers lies in the choice of regular contracts. These notions had originated from my field surveys in Aurepalle (one of the villages under ICRISAT's study) during 1991 and 1992. During the interviews, a number of labourers frankly told that they participated in regular contracts because they are rationed in the credit market. Regular contract with the employer gives them ready access to credit (advance payment). More interestingly, I met some labourers who admitted that they will eventually go back to their family business once their credit need would be over.

Finally, it is to be noted that there are some other factors which are not considered here and which may also affect the choice of labour contract such as institutional interventions in the labour market (state, workers' organisations), the impact of technical change (particularly mechanisation) and the importance of traditional norms in hiring decisions (having a regular labourer provides prestige/status to the employer. Some of these issues will be considered in chapter seven, in the light of empirical evidence from rural India.

Figure 1

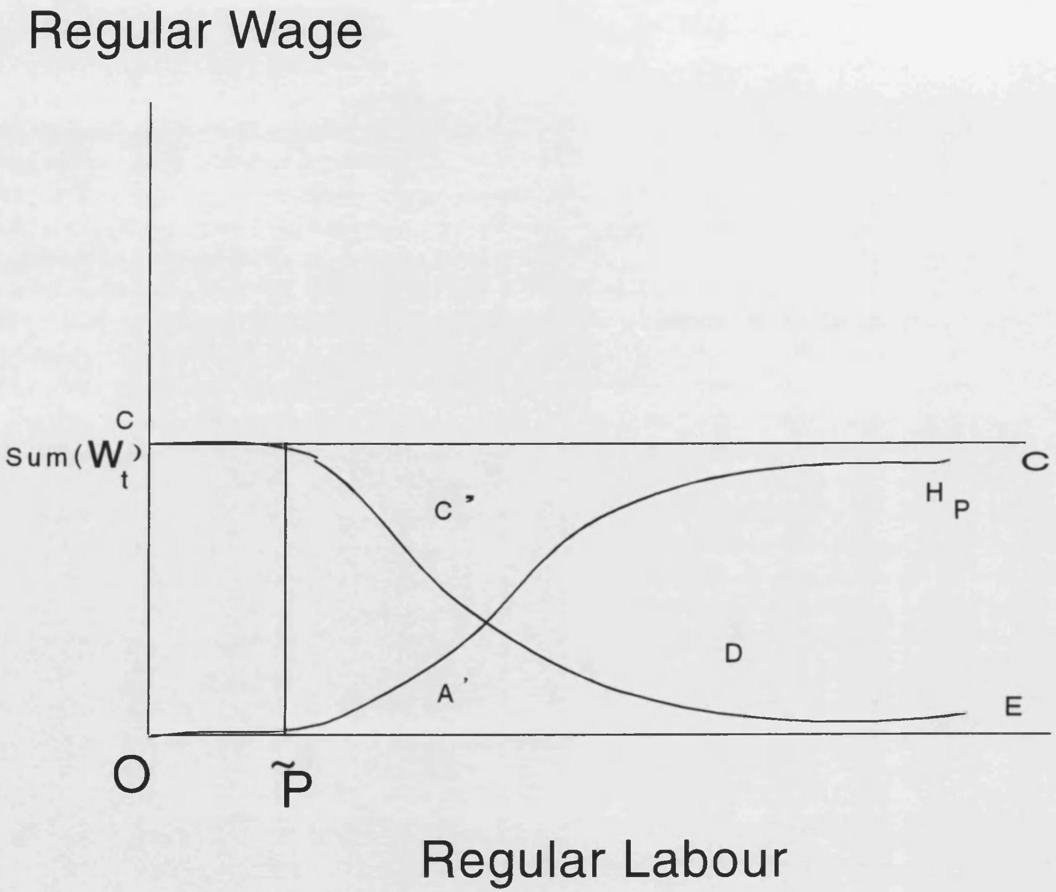


Figure 2

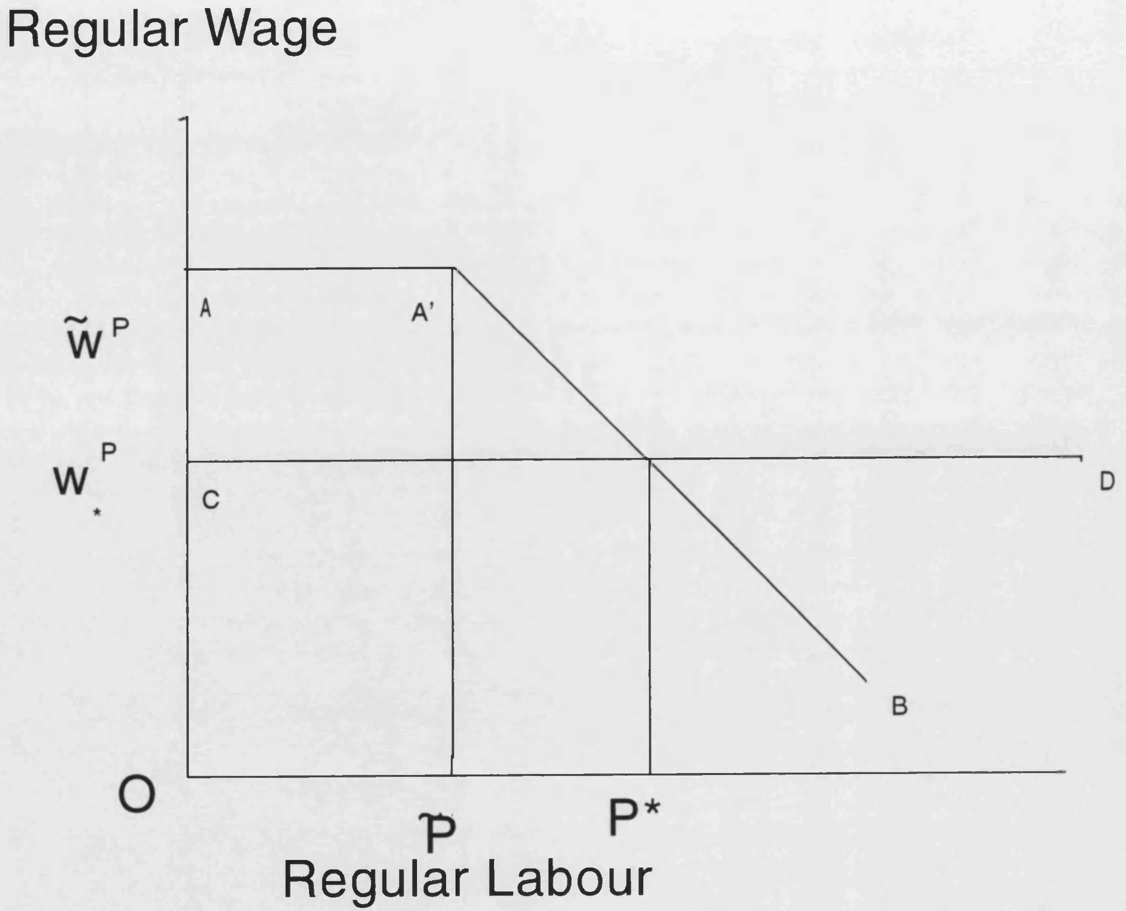


Figure 3

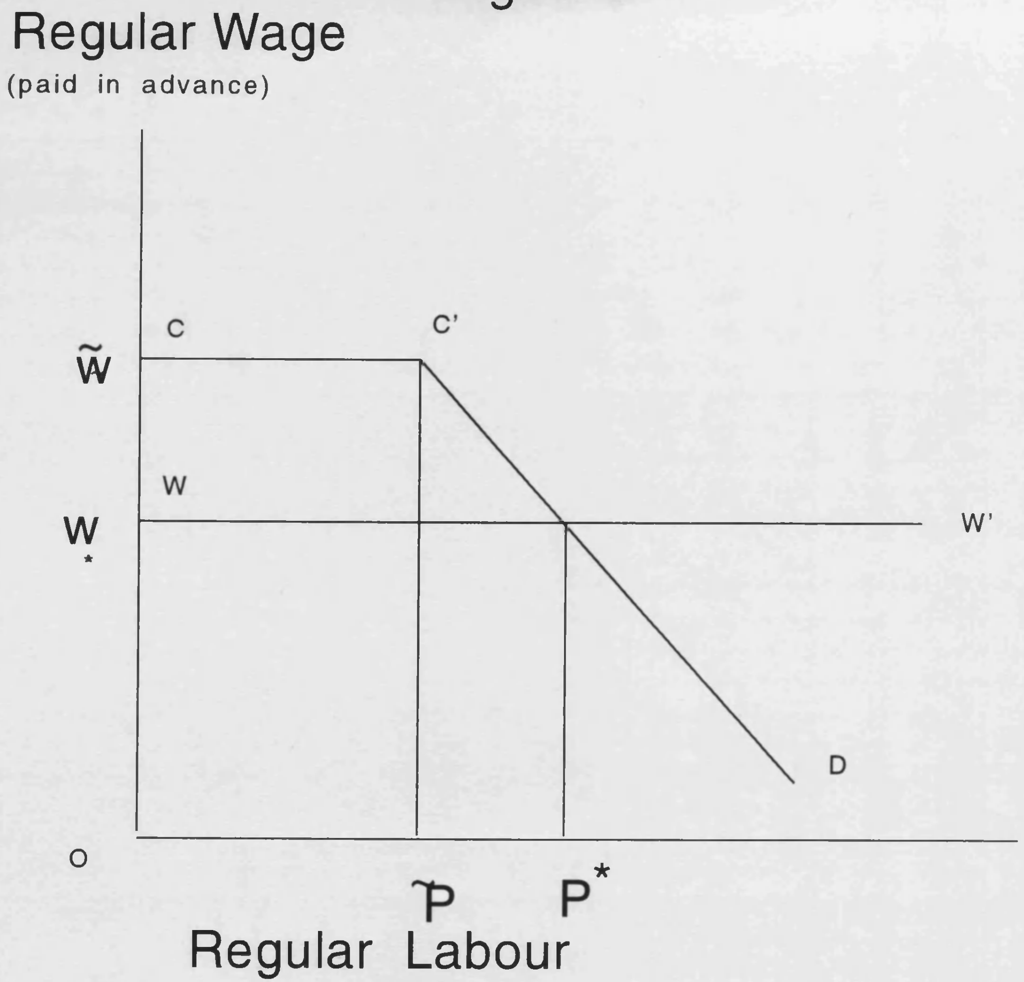
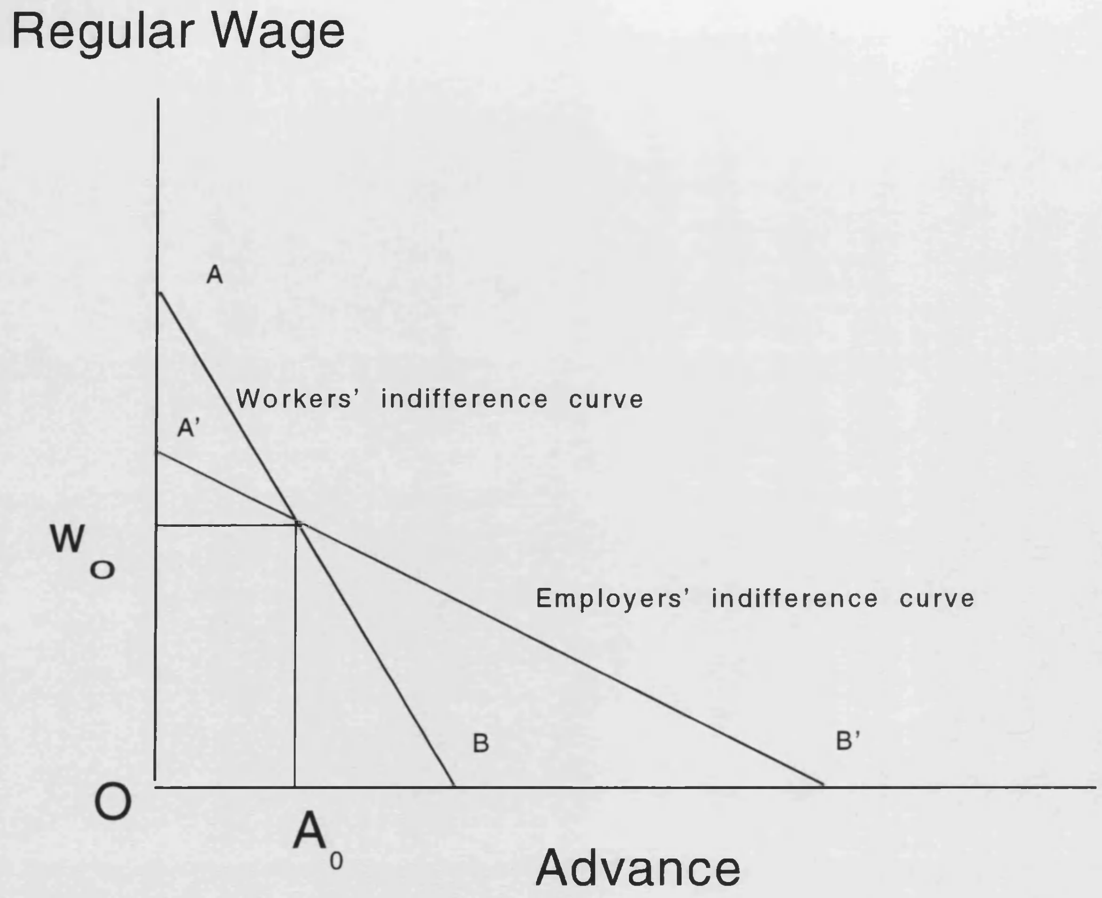


Figure 4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CHAPTER 3. CASUAL AND REGULAR CONTRACTS : A CASE STUDY

DESCRIPTION OF THE STUDY VILLAGES, ENUMERATION OF THE DATA-SET AND CLASSIFICATION OF FARMS

This chapter deals with the description of the study villages, enumeration of the data-set and classification of sample farms/households. The chapter is divided into two sections 3.1 and 3.2. Section 3.1 deals with the enumeration of the data-set and the construction of variables used in the analysis while section 3.2 considers the classification of sample farms according to the distribution of land and non-land resources in the study villages.

3.1. Description of the Study Villages and Enumeration of the Data-Set

The section is developed as follows. Section 3.1.1 discusses the significance of the data-set while section 3.1.2 describes the socio-economic characteristics of the study villages. In section 3.1.3, the variables used for the analysis in this dissertation are described. The primary data-set consists of the data collected by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) situated in India. The original data-set is supplemented by two successive resurveys of one of the study villages (Aurepalle) which I have carried out in the winters of 1991 and 1992; these are discussed in section 3.1.4. The section concludes with a discussion of the advantages and disadvantages of the data-set in our analysis.

3.1.1. Data-Set and Its Significance

Once the analytical framework had been defined, an appropriate data-set was required to test the proposed hypotheses. However, given the time and cost constraints, I was unable to conduct my own survey. Hence, I looked for an already existing cross-sectional data-set. There were not many systematically maintained cross-section village studies in India. In addition, there were problems of availability of the existing data-set. The selection of the data-set, therefore, involved a considerable amount of search costs. Once the pilot-search was over, I was left with three options : (i) data collected from the north Indian village of

Palanpur by Bliss and Stern (1982), (ii) Rudra's study of the villages in West Bengal (1982b) and (iii) the ICRISAT village study. My primary difficulty with the Palanpur data arose from the fact that there were no regular farm contracts available in Palanpur (Drèze & Mukherjee, 1987). In Rudra's data, the village was taken as the unit of account. I, however, intended to study the choice of contract at the individual level. This naturally led to the choice of the ICRISAT data set which has been used in a number of studies (e.g., see Walker & Ryan, 1990).

Since 1975, ICRISAT has been involved in village level studies (VLS) to analyse the socioeconomic, agro-biological and institutional constraints to agricultural development in the semi-arid tropical (SAT) areas of India. Information gathered from such village studies helps in recommending technology which is feasible and acceptable to the farmers. Since the main purpose of the VLS is to understand the traditional farming systems in different agroclimatic zones, five districts representing major agroclimatic zones within the SAT of India are purposively selected. The basic factors considered for the selection of the districts are soil types, pattern of rainfall and relative importance of crops like sorghum, pearl millet, pulses and groundnuts - crops in which ICRISAT is primarily interested.

The data-set covers wide-ranging aspects of traditional farming households, and is unique in many ways.

(i) This is one of the few systematically maintained agricultural data-sets in a developing country covering a cross-section of farming households across a *number of villages* and over *a period of 10 years*. Hence, it allows both a comparison of sample households across villages and also a comparison over time.

(ii) It gives information not only about the cultivation and participation behaviour of the sample households, but also about the income and consumption expenditure of these households.

(iii) Cultivation particulars include highly disaggregated plot-wise and task-wise input-output details (in quantity as well as in value terms) covering a wide range of traditional and modern inputs used among the sample households belonging to different landholding classes.

(iv) The data-set is rich in the information that it provides about the asset structure of the farming households. It looks at the ownership of various farm and non-farm assets as well as the financial assets of the sample households over a period of ten years, which is not available in many studies.

In addition, we make use of the resurvey data collected by ICRISAT from the study villages in 1989 which offers a more recent set of information; this has been useful in our study of the evolution of contracts in the study villages. Original information is further supplemented by my visits to Aurepalle (one of the ICRISAT villages) in January 1991 and then again in January 1992 (see our discussion later in this chapter) which sheds light on the family background of the regular farm servants.

3.1.2. Characteristic Features of the Study Villages

Originally, ICRISAT had chosen six villages from different agroclimatic zones. These are Aurepalle and Dokur in the Mahboob Nagar district of Andhra Pradesh, Shirapur and Kalman in the Sholapur district and Kanzara and Kinkheda in the Akola district of Maharashtra. Later, Dokur was dropped from ICRISAT studies; moreover, the information from Kalman and Kinkheda was not regularly maintained after 1978-79. Hence, for the purpose of the study in this dissertation, we shall focus on the information collected from three of these ICRISAT villages, namely, *Aurepalle, Shirapur and Kanzara.* The basic features of these selected villages are summarised in table 1.2.

The choice of these villages is guided by the following factors : (i) Data for these villages has been consistently maintained for the entire period (1975-84). (ii) These villages are in three different agroclimatic regions of the semi-arid tropics (situated in different states of India) and, hence, they allow interesting inter-village comparisons of household behaviour over the years.

3.1.2.1. Agro-economic Characteristics

'*Aurepalle*' is situated in the Mahboob Nagar district of Andhra Pradesh. The average annual rainfall is around 700 mm. and the variance of this rainfall is quite high; in 1980 the rainfall was 457 mm. while in 1978 it was 1010 mm. Most rainfall is concentrated in the months of June to September. Although dry, the region has supported a considerable amount of rice cultivation with the help of tank and well irrigation for a long time. March through May are the months of field preparation in dry lands. Kharif planting[1] begins in June and continues until the second week of July. Farmers are busy with interculturing (usually sorghum-pearl millet-pigeonpea) during July and September. Kharif crops are generally harvested during the months of October-November (early). Rabi cropping starts in

[1]If a crop is planted early June to August, it should be treated as a kharif crop irrespective of the harvesting date. Similarly, if any crop is planted after September and harvested before March/April, it is a rabi crop. Any crop planted after the rabi in the months of March/April is treated as a summer crop.

September-October and crops are harvested in January-February. Kharif paddy is planted in June-July and harvested in November-December while rabi paddy is planted in December-January and is harvested in March-April.

In Aurepalle most wages (daily as well as regular) are paid in kind - 5-6 kgs. of paddy to men and 3-4 kgs. of paddy to women per day. The male-female distinction is pronounced in the casual labour market. Labour income is predominantly derived within the village from the agricultural labour market. Besides landless households, small and medium farmers also participate in the village labour market.

'*Shirapur*' is situated in the Sholapur district of Maharashtra state. The region has remained an area of drought and scarcity for most of its history. Periodic famines and relief works are part of its recorded history. Under British rule, Sholapur city has gained gradual importance as being one of the centres of the cotton textile industry and contributed largely to the employment opportunities of the region. Sholapur district has a bimodal rainfall pattern with an annual average rainfall of less than 700 mm. The first peak appears in the month of June while the second phase starts in the month of September. It is difficult to work in the deep black soils after the heavy rain in June. If the rain is not sufficient in June, the soil will not be charged with moisture and crops may fail; if there are excess rains, waterlogging may spoil the harvest. Moreover, if there is excess rainfall for a prolonged time in September, it may harm the flowering of the kharif crops. Because of the erratic pattern of rainfall in the area, rabi cropping offers more assured crop prospects than kharif cropping. Consequently, rabi crops are the most important ones in the region. On an average, 64% of the gross cropped area is sown in the post-monsoon season. Summer crops are negligible. Intercropping is practised by all farmers. About 3 to 4 crops are mixed in a single plot. Pigeon-pea, pearl-millet, hybrid sorghum, paddy, ground-nut, maize etc. are grown during the kharif season whereas local and hybrid sorghum, chickpea, safflower, wheat are grown in the rabi season.

The third village included in our study is '*Kanzara*'. It is situated in the Akola district of Maharashtra. The district had always been intensely cultivated and was famous for growing cotton. After 1867, the construction of railways encouraged the extension of the area under cotton by 50%. Murtizapur (which is 8 km. north of Kanzara), the taluka head quarter had seven cotton presses and ten ginning factories. Akola region has three distinct seasons : (i) hot season (February-June), (ii) rainy season (June-October) and (iii) cold season (October-January). The rainy season begins with the arrival of the monsoon in the second week of June and continues till the end of September. In comparison to the other two villages, Akola region is a more assured rainfall area. The average annual rainfall in Kanzara is 995 mm. The maximum rainfall is usually received in the month of July. With the onset of the monsoon, farmers begin kharif planting (around the third week of June). Major kharif crops are cotton, pigeon-pea, hybrid sorghum, groundnut, mung and urad. Rabi cropping starts soon after the kharif harvesting of mung, hybrid sorghum and paddy in October. Harvesting of wheat and chick-pea is finished by the third week of February. From March until the onset of the monsoon, farmers prepare their fields for the next kharif season. This is a relatively relaxing period for the farmers.

There are three distinct seasons in all these villages, namely, kharif (rainy season), rabi (winter) and summer. However, given the variation of climatic condition among the study villages, kharif is the main crop in Aurepalle (67.6% of the plots have been sowed) and Kanzara (85.3% of the plots have been sowed) while rabi is the main crop in Shirapur (59.8% of the sample plots have been sowed).

3.1.2.2. Socio-Economic Characteristics

As many as 22 castes exist in Aurepalle. Caste norms are strictly followed in the village even today. The higher caste people do not allow scheduled caste (Mala and Madiga) families to work in their houses, but hire them to work in their fields. The traditional occupation of the Malas is participation in agricultural wage employment while Madigas are leather-workers by tradition[2]. At present, regular farm servants (RFS) in the village primarily come from Madiga castes; sometimes Mala and/or Gowda (toddy-tappers by tradition) also participate in the regular market. Even in the daily labour market, labour is supplied mainly by these two castes - Mala and Madiga; the importance of caste in labour market participation is quite unique to this village.

There are different castes in Shirapur; but the caste norms are not as strict as in Aurepalle (Walker & Ryan, 1990). The most obvious caste distinction is that made between the Harijans (Mahar, Huler, Cobbler and Musician) and the upper castes. There are no physical barriers between the communities and many a Maratha and shepherd family has Harijan neighbours. A majority of the wage labour comes from the landless labour households who belong to Harijan families. However, no caste-based participation is observed in the regular farm labour market in the village.

There are 14 castes in Kanzara. Like Shirapur, the most obvious caste distinction is between Maratha (the highest caste) and the Mahar and Mang (the lowest castes). Caste

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[2]For a further discussion, see section 3.2.4.

barriers are much weaker nowadays than they used to be.

Farming in Kanzara is carried on by both men and women. Ploughing, harrowing and hoeing are performed by males only while weeding and picking (cotton) are exclusively done by females. Harvesting and threshing are performed by both sexes. This sex-based segmentation of agricultural operations is prevalent in the other two study villages as well. For example, in Aurepalle, transplanting and weeding are the two operations exclusively done by women labourers while ploughing, harrowing and hoeing are usually reserved for male labourers. Harvesting and threshing are carried out by both men and women. In Shirapur, too, many agricultural daily-rated tasks are sex-specific in a very similar way - men plough and women transplant and weed. However, in all three villages, regular farm servants are predominantly male members[3].

3.1.2.3. Tenancy Versus. Regular Contracts

So far, we have only considered the types of wage labour prevailing in the study villages. This overshadows the issue of tenancy. This sub-section, therefore, analyses the incidence of tenancy in relation to regular labour contracts in the study villages[4].

Tenancy and regular farm contracts are two variants of the long-term land-labour arrangement as against the short-term one (daily or piece-rate). Both of these contracts are agreed upon for a stipulated period of time. In the case of regular contracts, labourers work on the employer's (who is also the landlord) land under his guidance and supervision at a fixed wage rate (agreed upon by both the parties). In the case of tenancy, however, tenants cultivate landlords' land on their own and they are co-claimants of the residual profit. The advantage with tenancy is that the tenant has a share in the residual profit so that he has an incentive to put in the right amount of effort. In the case of wage labour, however, no-shirking is to be ensured by monitoring or some other incentive mechanism which may be expensive.

In the semi-arid tropics of India, the incidence of tenancy varies from one region to another. However, it is most common in the drought-prone Sholapur villages[5]. In contrast, only about one field in twenty is cultivated by a tenant in Aurepalle. Although both share-

[3] Given our direct interests, we abstain from analysing the male-female division in the labour market, apart from indicating some of the sex-specific features of the rural labour markets. Some discussion can be found in (K. Bardhan, 1977a, 1977b, 1977c).

[4] There is a vast literature on tenancy arrangement, but the link between tenancy and wage-labour contract is not much discussed (Hayami and Otsuka, 1988).

[5] This section is based on Jodha (1981), Shaban (1985, 1987) and Walker & Ryan (1990).

cropping and fixed-renting exist in each village, share-cropping is more prevalent in Shirapur than in Aurepalle. On the other hand, fixed-renting is relatively commoner in Aurepalle because of the larger proportion of absentee landlords in the village. Because of the difficulty of supervising the sharecropped area, absentee landlords ensure a fixed income from land, by offering a fixed-rent tenancy (see table 1.2.3).

A common feature of tenancy in the study villages is the short duration of the lease. In most cases (share-cropping or fixed renting), the duration of leasing-out in any of these study villages is one crop season. This is due to influence of the tenancy legislation Act. Landowners are aware of the threat of losing their land to the tenants with leases of longer duration. Consequently, there is a virtual abolition of longer-term tenurial contracts such as '*Rehan*'[6] tenancy in Aurepalle. No cases of 'Rehan' were reported among the respondents from 1975 to 1985.

Even in the face of tenancy legislation, the incidence of tenancy (though of shorter duration) is found to be a common way of tying long-term labour to land in Shirapur, but not so much in Aurepalle or Kanzara (where long-term labour contracts are more common). The obvious question that arises is why tenancy is replacing regular contracts more in Shirapur and less in Aurepalle or Kanzara. The plausible reasons are as follows : (i) Shirapur is situated in the drought-prone area of Sholapur where the risk of crop failure is higher than in Aurepalle or Kanzara. This acts as a disincentive to the employer to invest in agriculture. They would prefer some arrangement where the risk is shared with others. Under the circumstances, share-cropping arrangements suit the needs of both the landlord and tenants to help carry out agricultural production. (ii) The incidence of tenancy has been, to some extent, brought about by the farmers' effort of allotting bullocks to land (also, see Pant, 1985). The 1971-73 drought in Shirapur has led to increased mortality among bullocks. However, following the drought, many households could not/did not buy bullocks to re-initiate cultivation. Moreover, due to the increased price of fodder, many households are forced to sell their bullocks. In other words, risk-sharing and resource adjustment on land may be two major justifications for farmers in Shirapur to use tenancy more than wage-labour.

As already mentioned, shorter-duration tenancy contracts are usually preferred in order to avoid tenants' ownership rights laid out in tenancy legislations. If, however, the landlord is an absentee one or if the landlord is old or there are some kinship ties, land may also be leased out for a longer duration. Usually, a share-cropping arrangement is made

[6]In this case the owner used to sign over the cultivation rights of the land to the tenant in exchange for a loan.

between landlords and tenants in the case of short-period lease where the tenant's share varies between 50% to 75% of the output depending on the arrangement of input allocation. On the other hand, a fixed-rent contract is executed if the lease is for a longer duration.

3.1.3. ICRISAT Data-Set

The ICRISAT sample consists of forty randomly selected households from each village, ten each from four different categories of households, namely, labour, small farmers, medium farmers and large farmers denoted by the numbers 0, 1, 2 and 3 respectively. Table 1.3[7] shows the classification of three farming classes (denoted by the numbers 1, 2 and 3) in the study villages.

For labour households a random selection of ten households is made amongst those who operate less than 0.2 ha.[8] of land and who hire themselves out as labourers (as primary occupation). In the case of farm households, the purpose is to give a proper representation to small, medium and large farmers. In view of the different land-man ratios and the wide variation in average size of operational landholding and land-productivity differences among the selected villages, different criteria have been chosen for the classification of farm-size groups for each study village. For example, farmers classified as 'large' in Shirapur and Kanzara hold more land than those in Aurepalle.

The analysis in the dissertation is primarily based on the situation prevailing in the study villages during the second half of ICRISAT's study, namely, 1980 to 1984. Most of our empirical analysis refers to this period, unless otherwise stated. All the variables in value terms have been reduced to a base year of 1960-61 = 100 using the appropriate index number (described in the relevant sections).

The choice of the period is, to some extent, decided by the fact that most of the work on ICRISAT data is based on the first phase of ICRISAT village level studies (VLS), namely, 1975/76-79/80 or the whole ten-year period (1975-84). Moreover, since 1979 there are changes in some of the VLS schedules. Hence, I intend to focus primarily on the second phase of the VLS data at ICRISAT, i.e., the period 1980 to 1984.

As already mentioned, two additional data-sets will be used to supplement the original information. These are the resurvey data collected by the ICRISAT in 1989 from all three study villages, and the resurvey data collected by me from Aurepalle in 1991 and 1992

[7]Here the terms 'farms' and 'households' are used interchangeably. Each consists of a number of members, taking part in the production (in the family or elsewhere) as well as consumption activities.

[8]The conversion factor between hectares and acres is as follows: 1 ha. = 2.5 acres.

(see section 3.1.4).

Information about various aspects of traditional farming practices and household economies was collected through 12 specifically designed work sheets/schedules as follows:

(i) VLS-C : Household Member Schedule

(ii) VLS-E, F, G, N, P : General Endowment Schedules

(iii) VLS-K : Labour, Draft Animal and Major Machinery Utilization Schedule

(iv) VLS-Y : Plot and Cultivation Schedule

(v) VLS-L : Household Transaction Schedule

The variables used for the analysis have been constructed from these schedules. A brief account of the method of constructing these variables is given here.

3.1.3.1. VLS-C : Household Member Schedule

The VLS-C schedule is designed to collect demographic, educational and related details of the individual members in the sample[9]. This schedule is recorded at regular intervals to register the change in household composition in each year. It contains the personal characteristics of each member of the household[10]. The schedule is adjusted to consider each member once a year. If there is a change of status (e.g., if the member left the household or re-entered) after the rabi (second) season, s/he is not included. With this adjustment, the following variables are constructed for each village and for each agricultural year during the period 1980-84 :

TYPE = 1 if LHCLASS = 2, 3
        = 0 if LHCLASS = 0, 1 .
AGE = Age of the i-th individual in years

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[9]If a sample household migrates permanently, a substitute household is randomly selected from the same group of households in the village. But when a household migrates temporarily, no substitute household is selected. All the information from the temporarily migrated household continues to be collected with a note in remark columns, if in any round of the survey a household is not available in the village. There is no observation in the VLS-C but a line is coded with the household identification and date, keeping other columns blank.

For division of household (splitting of family), all members not belonging to the subgroup (split family) of the leading household member (father, eldest son etc.) are coded as leaving the sample household, with appropriate recording in the appropriate schedule. Landholdings and other capital assets that are divided are adjusted accordingly and information in other schedules are collected for the main family as the sample household.

In each village, thirty households from the cultivator group and ten households from the labour group were randomly selected; hence the sampling fractions are not the same for these two groups.

[10]There are also additional details about family members residing outside like their place of work, purpose, frequency of visits in the village, remittances.

SQAGE = Square of age.
MALEORN = 1 if the i-th individual is a male
= 0 if female
EDUCAORN = 1 if the i-th individual is going/has gone to school
= 0 if illiterate
ABLEORN = 1 if the i-th individual has no physical disability
= 0 otherwise.

Members of the household who are at or above the age of six years and sell labour in farm and/or non-farm activities are called casual labourers. Hence, the VLS-C schedule provides the personal details of the group of casual labourers in the study villages.

Information about regular farm servants are also included in this schedule. The following variables are constructed for each village for a pool of regular labourers hired between 1980 and 1984.

AGE = Age in years
SQAGE = Square of age
MALEORN = 1 if the i-th labour is male
= 0 otherwise
EDUCAORN = 1 if the i-th labour is literate
= 0 otherwise

3.1.3.2. VLS-E, F, G, N, P Schedule

This is a broader group of five schedules which are normally collected once a year in the beginning of July. These schedules are coded separately under different names as given below. We shall, however, make use of VLS-E, VLS-F and VLS-P schedules only for our purpose; we do not need to use the information contained in VLS-G and VLS-N schedules.

Name of the Schedule	Schedule Code
Animal Inventory Schedule	E
Farm Implement Inventory Schedule	F
Farm Building Inventory Schedule	G
Stock Inventory Schedule	N
Credit and Debt Schedule	P

VLS-E : Animal Inventory Schedule

The VLS-E schedule contains information about the ownership and value of the livestock ranging from cattle-bullock-buffalo to sheep-goat, cock-hen and pig as well as the stocks and values of the animal products (after deflating by the state-wise consumer price index constructed for miscellaneous items for the agricultural population at 1960-61 prices). For the purpose of analysis, the following variables are constructed from this schedule.

OBULVA = Value of the cattle, bullock and buffalo owned by the farm at 1960-61 prices
OTHBULVA = Value of the other animals owned by the farm at 1960-61 prices.

VLS-F : Farm Implement Inventory Schedule

The VLS-F schedule contains information about all major implements and minor farm/non-farm machineries. For major implements and machineries, the number and values of the machine/implement concerned are recorded. For minor implements, where several types of tools are involved, it is sufficient to record their total value. The following variables are computed for each year in each of the study villages (after deflating by the state-wise consumer price index constructed for miscellaneous items for the agricultural population at 1960-61 prices)

TNIREQ = Value of traditional non-irrigation equipments at 1960-61 prices.
MNIREQ = Value of modern non-irrigation equipments
IREQ = Value of irrigation equipments (modern + traditional)
NFDCEQ = Value of non-food crop equipments (like sugar-cane crusher, oil extractors etc.)
NFMEQ = Value of non-farm equipments (like those used in handicrafts)
SEQVAL = Total value of different farm and non-farm equipments owned by the sample households
PCTFEQVA = Proportion of farm equipments in the total value of different farm and non-farm equipments.

VLS-P : Credit and Debt Schedule

The VLS-P schedule records different financial items (and their values) like credit (or debt), deposit, savings, insurance policies held by the sample households for different purposes during each year of the study period. First, the following variables in value terms (after deflating by the statewise consumer price index for general items for the agricultural population at 1960-61 prices) are constructed for each household.

CREDIT - Amount of credit outstanding (to different partners of the transaction including that lent to regular farm servants)
DEBT - Amount of debt
DEPOSIT - Amount of deposit
SAVINGS - Amount of savings
LIC - Amounts invested in insurance
FINAST - Amount of other financial assets, if any.
TFINASTVA = CREDIT + DEPOSIT + SAVINGS + LIC + FINAST
PCTCDT - Proportion of credit offered to different partners in the total value of different financial assets.

Secondly, these financial items are aggregated according to the source. In this respect, we divide the source into two categories : (i) Amounts lent to or borrowed from the organised credit market, namely, the government (local or state), the co-operatives, commercial banks etc.; (ii) Amounts lent to or borrowed from the informal credit market, namely, village moneylender, friends, relatives etc. Accordingly, the following variables are constructed (1960-61=100) for each household for each year :

TCREDIT - Total amount of credit outstanding
TDEBT - Total amount of debt to be repaid
PCTDFML - Proportion of total debt from the formal source.

3.1.3.3. VLS-K : Labour, Draft Animal and Major Machinery Utilization Schedule

The purpose of the VLS-K schedule is to record the resource utilization of the members of the sample households in the casual labour market at regular intervals. The investigators interviewed sample households every two to three weeks to elicit information. With reference to the day of the interview, we have information about the days worked on own farm, others' farms, other non-farm or governmental projects, days involuntarily unemployed etc. From the available information, a series of aggregated participation variables[11] are computed for each year :

SOWNFWD - Total number of days worked on own farm
SFDAY - Total number of days worked on others' farms
SNFDAY - Total number of days spent on non-farm work
SGDAY - Total number of days spent on government work
SUNEMP - Total number of days spent involuntarily unemployed.

Secondly, we compute a series of aggregated wage variables for each labourer for each year as follows :

TFWAGE = Total wage from farm work at 1960-61 prices
TNFWAGE = Total wage from non-farm work at 1960-61 prices
TGWAGE = Total wage from government projects at 1960-61 prices
TOTCWAGE = SFWAGE + SNFWAGE + SGWAGE

3.1.3.4. VLS-Y : Plot and Cultivation Schedule

The VLS-Y schedule is designed to record operation-wise input-output data for each plot for each household engaged in farming at regular intervals during the study period (1980-84). It also includes the important characteristics of each plot, including those of the sub-plots.

The schedule is divided into two parts. Part one of the schedule gives the plot-wise variables over different seasons of the year, namely, kharif, rabi and the summer. These variables include the area cultivated, area irrigated, sources of irrigation, soil type, value of the plot per acre, revenue rate (that do not change during a crop year) etc. However, we find that while kharif is the main crop-season (when most of the plots are put to cultivation) in Aurepalle and Kanzara, rabi is the main crop-season in Shirapur. We, therefore, construct the

[11]These participation variables have been weighted by the days worked on the respective types of jobs as a % of total days worked in the year.

following variables for the kharif season in Aurepalle and Kanzara and for the rabi season in Shirapur for each sample farm for each year of the five-year period.

CULTAREA - Area cultivated by plots in acres (1 ha. = 2.5 acres)
IRRAREA - Area irrigated by plots in acres
PLOTVAL - Value of plot per acre in Rs. 100 (deflated by the consumer price index for general items for the agricultural population with 1960-61 as the base year).

Next, the total area owned, cultivated and irrigated are aggregated by adding the area under each plot. Variables constructed at this stage are as follows :

NPLOT = Number of plots cultivated by each household in a given season.
MPLOTVAL = Mean value of the plots per acre belonging to each household
AGGAREA = Total area owned
AGGCULT = Total area cultivated
AGGIRR = Total area irrigated

Part two of the schedule reports the task-wise details of the labour and non-labour inputs used in the production of different crops cultivated on different plots by each sample household in a particular crop year. In other words, the schedule yields household demand for different types of labour including casual and regular labour. The following variables are constructed for each sample farm for each year :

TASK = a if labour is hired for tasks like soil preparation, manuring, applying fertilizer or doing irrigation.
= b if labour is hired for tasks like transplanting, weeding and interculturing
= c if labour is hired for tasks like harvesting and post-harvesting work

For each type of task, the following variables are constructed :

FLHR = Total family labour-hours
FLHRHA = Family labour-hours per acre (1 ha. = 2.5 acres) of land cultivated
CLHR = Total casual labour-hours
CLHRHA = Casual labour-hours per acre of land cultivated
PLHR = Total regular labour-hours
PLHRHA = Regular labour-hours per acre of land cultivated

A similar exercise is repeated for a few major crops produced in each of the study villages to look at the input-output composition. For example, we have considered the production of paddy (local and hybrid types) in Aurepalle, cotton (local and hybrid types) in Kanzara, sorghum in Shirapur.

Finally, the following aggregated variables are constructed for all the crops produced in the major season of the year by each of the sample households.

SFLHR = Total number of family labour-hours used on different plots

SCLHR = Total number of casual labour-hours used on different plots
SPLHR = Total number of regular labour-hours used on different plots
STLHR = SFLHR + SCLHR + SPLHR
OBULHR = Total number of own bullock labour-hours used on different plots

OBUL = 1, if OBULHR (own bullock hours) > 0
= 0 otherwise.

3.1.3.5. VLS-L : Household Transaction Schedule

The VLS-L schedule gives information regarding the income accounts and consumption expenditure of each sample household as well as the inter-enterprise transactions among the sample households. We make use of the income account for our purpose; the schedule is used to break down the income into different components for the sample households for each year of the study period (1980-84) at 1960-61 prices.

CROPINC - Total income from crop production net of production costs;
LIVESTOC - Income from the sale of different productions and/or hiring out animals net of costs on labour, inputs, fuels etc.;
RENTINC - Income from land-leasing/share-cropping, land/building/machines acquired/sold, capital gains, animals, implements, etc. net of taxes, fees, fuels, labour and machine expenses;
LABINC - Income from regular jobs including regular farm servants, from daily and exchange labour (unlike the VLS-K schedule, no distinction is made between farm and non-farm labour)
TRANSINC - Income from savings, Life Insurance, interest on credit, gifts, remittances, pension etc.
MISCINC - Income received from handicrafts, trading, personal service trades, marketing etc. net of taxes, fees, fuels, materials and labour expenses.
TINC = CROPINC + LIVESTOC + RENTINC + LABINC + TRANSINC + MISCINC.

3.1.4. Resurvey Data-set

As already mentioned, I have conducted two resurveys to Aurepalle, once during the winter of 1991 and then again in 1992.

During the first resurvey in January 1991, we[12] interviewed a group of farmers and labourers (both casual and regular) about the general economic conditions prevailing in the village labour market. In particular, the employers were asked about the usefulness of alternative contracts (e.g., regular, piece-rate or daily labour contracts) and their preference for one contract against the other. Labourers were asked about their preference for alternative

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[12] I was accompanied by Mr. Nageswar Rao from the ICRISAT head quarters at Hyderabad; Mr. Rao helped me in interpreting the local language 'Telegu'.

contracts (e.g., piece-rate, daily or regular) and whether they had any plan to change this current jobs and, if so, why.

Employers, in general, appear to prefer piece-rate contracts because it requires less supervision and the work is done in time. However, piece-rate contracts are more expensive compared to daily rate casual contracts or regular contracts and are used in those tasks like harvesting where the cost of delay may be substantial. Though cheaper than piece-rate contracts, daily casual contracts require close supervision which, too, involves some costs. Employing regular labour is cheap, but sometimes the rate of absenteeism is very high.

Access to interest-free wage advance (i.e., credit) was found to be the primary motivation for labourers to choose regular farm contracts who could not secure credit from the credit market in the village. Landless labourers who neither had any alternative source of credit, nor the opportunity to do family farming, in particular, preferred to participate in full-time regular farm contracts. Secondly, some regular labourers reported that their family landholdings were too small to enable them to survive and, in most cases, the land was not even irrigated; they also could not afford to purchase expensive inputs like fertilizer, pesticides etc. to cultivate their own land. Hence, it is more convenient for them to choose regular farm contracts. Thirdly, some reported that they did not like searching for casual jobs once a particular job was over, and their prospects for non-farm jobs in the village were poor. In other words, in the absence of alternative opportunities, risk-averse landless labourers preferred to participate in regular farm jobs, thus securing some livelihood for the year[13]. A number of other factors also emerged from our discussion with the employer and labourers. Regular contracts involved less supervision. Sometimes regular labourers also supervised casual labourers who were working for the same employer; the latter gave them some power over the casual labourers. However, some young enterprising labourers reported that they would prefer to participate in piece-rate contracts which offered higher wages; though the pace of work was greater, they liked the opportunity to earn more. On the contrary, the older and sickly labourers, who were unable to keep pace with the hard work of piece-rate contracts, preferred to do some light work on a daily basis. Some old labourers preferred to do regular jobs for some considerate employer whom they had known over a long period; this set them free from having to search for casual jobs when a particular job was over.

The second resurvey was primarily aimed at collecting information on the personal

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[13]In some cases, regular labourers had a continuing association with the employer; they preferred to work for a known entity.

details of a group of casual and regular farm labourers in the village. Information was collected from a group of twenty-six regular farm servants hired by the sample households in the on-going agricultural year 1991-92 which related to the following aspects.

FLHOLD = The amount of family landholding in acres
IRRORN = 1 if family land is irrigated
= 0 otherwise
MALAGA = 1 if the i-th labourer belongs to Mala or Madiga household
= 0 otherwise
CASTE4 = 1 if the i-th labourer belongs to caste ranking four
= 0 otherwise
FATHRFS = 1 if the father is/was a regular farm servant
= 0 otherwise
MEMOCCP = 1 if any family member of the i-th labourer is a casual labourer
= 0 otherwise
TOTWAGE = Amount of the wage to be received for the annual contract at 1960-61 prices.
ADVANCE = Amount of the advance taken by the i-th labourer from the employer
LOAN = The difference between advance and the annual wage if the former is larger.

All regular farm servants were found to be male. Hence, the personal details were collected from a group of eighty-five (85) male casual labourers hired by the sample households in Aurepalle in January 1992. Thus the very choice of the sample takes account of the sex-bias present in the labour market. For this sub-group, similar details, as from the regular farm servants, were collected; however, the family background of the casual labourers was left out (which was available in the ICRISAT data set).

3.1.5. Advantages and Disadvantages of the Data-set

The ICRISAT data-set is a detailed data-set covering wide-ranging aspects of traditional farming households over a period of time in a number of villages situated in the semi-arid tropics (SAT) of India. It has detailed information about the cultivation particulars of the sample households; it includes information about the casual market participation of the members of the sample households.

However, the analysis of the dichotomy in the labour market between the regular and casual contracts necessitates further information on the personal details of both groups of labourers. In this respect, the ICRISAT data is found to be less satisfactory. It contains the details of the casual labourers in the village (VLS-C and VLS-K schedules); however, when it comes to the personal details of the regular farm servants, the VLS-C schedule gives details of age, sex and the educational qualifications of the attached farm servants, but omits their family background. For example, size of the family landholding (dry or irrigated), number of dependents, occupation of the other members of the family to which the regular farm servants belong are not known. The resurvey of Aurepalle was directed towards this end.

Secondly, in the analysis of the labour market, one serious problem seems to be the following. VLS-Y schedule gives the plot and cultivation details (e.g., utilization of different kinds of labour, namely, family, regular and casual labour-hours). The VLS-C schedule gives the personal details of household members (some of whom participate in the casual market) as well as that of regular farm servants hired by the household (who are treated to be attached to the employers' households in the ICRISAT data). However, we do not have any way to match the two. For example, we cannot identify which one of the regular farm servants or the family members (given by the VLS-C schedule) contribute to the farm output and how much (given by the VLS-Y schedule) since the latter is given in aggregate hours (e.g., total number of family, regular or casual labour-hours used) for each type of task performed during the crop year.

3.2. Distribution of Resources and Classification of Farms in the Study Villages

The theoretical analysis in chapter two suggests that the division of the market between casual and regular labour contracts is closely related to an unequal distribution of land in the village economy where the larger farms tend to offer the regular farm contracts and the risk-averse landless labourers tend to choose the regular contracts. Given that landownership is one of the major explanatory variables in our analysis, it may be useful to examine the relationship between the distribution of land and non-land resources and then decide if the land-based classification of farms is a valid one.

Using the data-set described in section 3.1 of this chapter, the ownership and distribution of land and non-land assets is examined in this section. The section is developed as follows. Section 3.2.1 considers the distribution of land while section 3.2.2 examines the distribution of non-land resources among the small and large farms. Income is sometimes used as a measure of the ownership of land and non-land resources. Section 3.2.3, therefore, examines the distribution of income with respect to landholding status. Finally, section 3.2.4 examines the relationship between landholding status and the caste ranking of the sample households. The section is concluded with a brief summary of the findings.

3.2.1. Ownership and Distribution of Land

Irrespective of the availability of a wide range of village-level studies in India, there is no universally accepted method of classifying farms. Most official sources, however, classify farms according to the size of landholding[14], a norm followed by the ICRISAT too. A classification based on size alone, however, may be misleading because there may be wide variation in the physical quality of land, say, with respect to the location of the plot, soil-quality, availability of irrigation etc. even among plots of the same size[15]. Further differences may arise with respect to the households's efforts to adopt advanced techniques of production as opposed to traditional ones. These socio-economic factors may serve to differentiate households, even when they hold the same amount of land. That is why, in this section, the physical and technical quality of the plots owned by small and large farms/households in the study villages are examined.

3.2.1.1. Landholding Status

As has already been shown in table 1.3 of the chapter, the sample households are divided into four categories, namely, labour households, small farmers, medium farmers and large farmers.

The ownership of cultivable land is usually distributed over a few plots. The VLS-Y1 schedule gives plot-wise information of the size of landholding (AGGCULT, AGGIRR) as well as the number and value (NPLOT, MPLOTVAL) of the plots owned by the farms; the mean and standard deviation of these variables are shown in table 2.1.1.

The average cultivated area is the smallest in Aurepalle and the largest in Shirapur, though the average irrigated area is the smallest in Shirapur during the study period 1980-84. However, the plot value per acre is the lowest in Kanzara and the highest in Shirapur. In all these cases, a high standard deviation is noted which implies that land is unequally distributed among the sample households, both in quantity and in quality, whether cultivated area, irrigated area or plot value per acre is considered.

3.2.1.2. Distribution of Land

Land is distributed unequally in the study villages. The average operational

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[14] It is to be noted here that the concept of land ownership is not ambiguous in these Indian villages. Everyone knows who owns what; in other words, it is a strong notion of ownership.

[15] It is noteworthy here that there is no measure of farm size in the ICRISAT data-set based on standardised hectares, i.e., controlling for land quality.

landholding is 3.53 ha (2.4 acres = 1 ha) in Aurepalle. However, the average size of landholding of the largest farm size category is 7 times bigger than the average size of landholding, in general. In Kanzara, more than one-third of the households operate less than 8% of the total area while 6% of the households operate 33% of the total area. The same picture holds in Shirapur where 50% of the cultivating households operate 17% of the total area[16].

In order to examine the nature of the distribution among sample households, the labour households and small farms (as defined in the ICRISAT data-set) are aggregated as the 'smaller farms' while medium and large farms are aggregated as 'larger farms'.

Corresponding to this classification, a variable called TYPE is created as follows.

TYPE = 1 if the i-th farm is a larger farm
= 0 if the i-th farm is a smaller one.

There are 81 larger farms (TYPE = 1) in Aurepalle, 71 in Shirapur and 92 in Kanzara over this five year period. First, the difference in the mean and standard deviation of the area cultivated, area irrigated, soil quality and plot value between the small and large farms are considered. These are shown in tables 2.1.2, 2.1.2', 2.1.2" and 2.1.2''' respectively.

On an average, the larger (TYPE = 1) farms are found to have a greater number of plots as compared to the smaller (TYPE = 0) ones. When the area under different plots are added up (AGGCULT), larger farms continues to possess significantly larger amount of land as compared to the smaller ones (table 2.1.2).

Secondly, the differences in the physical qualities of landholding between small and large farms are considered. A comparison of the irrigated area between small and large farms shows (table 2.1.2') that the smaller farms have virtually been excluded from access to irrigation facilities. In addition, soil quality also varies between smaller and larger farms (table 2.1.2"). A greater proportion of large farms have access to better (more productive) soil quality[17] like the deep black and the medium to shallow black. This is also reflected in the difference in the mean plot value per acre (MPLOTVAL) between small and large farms (table 2.1.2'''). The difference is statistically significant in each case. Thus, the average plot value is higher among the larger farms indicating their access to plots with better location,

[16]A similar trend is found in an all-India perspective; 26th round National Sample Survey data reports that in 1971-72, 82% of rural households owned only upto 5 acres of land.

[17]Given the crop-pattern and climatic conditions, black soil plots are usually considered to be more productive in Shirapur and Kanzara while the red soil area is more productive in Aurepalle. However, there are some plots which are situated in the areas containing problem soil.

better soil quality and irrigation facilities. Thus the farms owning larger amounts of land also have the better quality land. In other words, a comparison of the physical attributes of landholding in the study villages reinforces the size-based classification of farms.

In order to determine the extent of inequality in the distribution of land resources, Theil's T and L[18] indices are calculated (for definition and choice of these indices, see Appendix 1). The distribution of cultivated and irrigated area are positively skewed in each village as shown by the Theil's T and L indices (see table 2.1.2""). The degree of inequality is found to be larger in the distribution of cultivated area (AGGCULT) as compared to the distribution of irrigated area (AGGIRR). According to Theil's T indices, the degree of inequality in the distribution of cultivated and irrigated area is the highest in Kanzara and the lowest in Aurepalle.

3.2.2. Ownership and Distribution of Non-Land Assets

Farms organise production with the help of labour (human and animal) and non-labour inputs. Some of these inputs are owned by the farms while others are bought or rented in the relevant markets. Besides land and family labour (human), a farm may own animal labour (bullocks, buffaloes etc.), farm and non-farm machineries as well as financial assets like savings, deposits, life insurance etc. The ownership of any of these inputs adds to a farm's wealth. This section considers the distribution of the non-land resources between the small and large farms in an attempt to examine the association between the ownership of land and non-land resources in the study villages.

3.2.2.1. Bullock Labour

Farming households use animal labour to carry on certain agricultural operations like soil preparation, ploughing, irrigation etc. Some of these animals are owned by the farms while others are hired. Information about the ownership of bullock labour (cows and buffaloes) is included in VLS-E schedule. The total value of bullocks (OBULVA) as well as the value of bullocks per acre of land cultivated by the sample farms is calculated at 1960-61 prices. The mean and standard deviation (in the parentheses) of OBULVA for smaller and larger farms are given in table 2.2.1.

There is a significant difference in the ownership of bullocks between the smaller and larger farms in Aurepalle and Kanzara, though the difference is not found to be significant

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[18]Theil's L index cannot be calculated if the variable concerned takes a value zero for some farms.

in Shirapur. However, the difference in the value of bullocks *per acre* of the land cultivated between the small and large farms is much smaller than that of total value of bullocks, though still the larger farms own more.

Moreover, the use of own bullock labour in family farming as obtained from the VLS-Y2 schedule is considered. In this respect, the variable OBUL is constructed as follows:

OBUL = 1 if the i-th household uses its own bullock in farming.
= 0 otherwise.

The proportion of cases (frequency) where OBUL = 1 is given in table 2.2.1'. In all the study villages, a greater proportion of larger farms is found to use their own bullocks in family farming as compared to the smaller farms.

3.2.2.2. Farm and Non-Farm Equipments

Information about the ownership of farm/non-farm equipments is found in the VLS-F schedule. After deflating by the appropriate consumer price index at 1960-61 prices, the variable SEQVAL is constructed. The mean and the standard deviation of the total value of farm/non-farm equipments (SEQVAL) and that per acre of the land cultivated are shown in table 2.2.2.

The total value of farm and non-farm equipments as well as the value per acre is higher in the larger farms in all the study villages, with a large standard deviation in each case, suggesting that there is an inequality in the distribution of such equipments.

3.2.2.3. Financial Assets

Details of the ownership of different kinds of financial assets held by the sample farms are given in the VLS-P schedule. Using this schedule, the value of all financial assets TFINASTVA is calculated at 1960-61 prices for each of the households for each year of the study period (1980-84).

The mean and standard deviation (S.D. in the parentheses) of TFINASTVA are given in table 2.2.3. In this case, too, larger farms have a larger share of total financial assets in all the study villages. In each case, this is associated with high standard deviation as well, and this is true whether the total value or value per acre is considered, the only exception being Kanzara.

An Overview

The analysis, in this section, strengthens the rationale for a size-based classification of sample farms. Larger farms, in the study villages, not only have more land, but also have better quality land as well as more non-land resources per acre[19]. This also means that land based classification alone underestimates the true extent of inequality. Ramachandran (1990) has also found that major landlords and upper class peasants in Tamilnadu own more land and non-land assets than agricultural labourers.

3.2.3. Household Income and Its Distribution

Household income is the sum total of the returns from the ownership of land and of different non-land resources. Given that the larger farms own more land and non-land resources, it is expected that the larger farming households will earn more income compared to the smaller ones. The hypothesis will be examined in this sub-section.

Information is gathered from VLS-L (Household Transaction Schedule). Different components of income are added to calculate the total income (TINC) of the sample households for each year of the study period (1980-84) at 1960-61 prices.

First, the average total income between small and large households is compared; the mean and standard deviation of income per household are shown in table 2.3 for the period 1980-84. The table indicates that, on an average, larger farms have a larger share of income and the computation of simple t statistics shows that the difference is significant in each case. Moreover, the variation of income among the sample households is large, thus indicating substantial inequality in the distribution of income between the smaller and larger farms.

Secondly, the degree of inequality in the distribution of income is calculated using Theil's T and L indices which are presented in table 2.3'. While Theil's T indices show that Aurepalle has the highest degree of inequality, Theil's L indices show Shirapur has the highest degree of inequality in income; in either case, Kanzara has the lowest degree of

[19]The results cause us to refer to the farm size and productivity literature which generally argues that there is an inverse relationship between farm size and productivity. It is argued that the inverse relationship holds good because the smaller farms use more inputs per acre. Hence, our distributional results on the ownership of land and non-land resources, obtained in this section, may be used as evidence against the established inverse relationship between farm size and productivity. This however, needs clarification. First, some argue that small farmers may be more productive primarily because they face a lower cost of labour than the larger one. Our results do not contradict this argument. Secondly, as Bhalla and Roy (1988) argue, if we ignore the labour market imperfections, land and capital market imperfections actually work in favour of the larger farms to make the relationship positive. The evidence obtained here may further strengthen their argument. Nonetheless, it should be borne in mind that the ownership of more land and non-land resources by the larger farms does not necessarily imply that they also use more of these factors in cultivation.

inequality in the distribution of income. A comparison between tables 2.1.2"" and 2.3' suggests that income is more unequally distributed than land. It fits with the observed fact that large farms have more non-land resources per acre than small ones.

Finally, in order to test the relationship between total income per household and landholding status, the chi-square tests of independence between total income and the landholding status variable TYPE are computed. Likelihood ratio statistics are 293.89440 (d.f.=208), 281.41284 (d.f.=202) and 277.25887 (d.f.=200) in Aurepalle, Shirapur and Kanzara, respectively, while Pearson's chi-square statistics are 212.0000, 203.0000 and 200.000, respectively, for Aurepalle, Shirapur and Kanzara. Both sets of chi-square statistics are highly significant. These statistics, therefore, indicate that there prevails a significant correlation between household income and landholding status in the study villages which further strengthens the land-based classification of sample farms.

3.2.4. Caste and Landholding Status in the Study Villages

Although caste does not play a crucial role in the analysis of this thesis, the relationship between caste and land ownership deserves brief examination. Caste is still an important factor in explaining the present day effects of earlier inequalities in the ownership and control of land and non-land resources which, in turn, is reflected in the economic and political power held by these households.

According to Doherty (1982), caste refers to socially inherited political and economic inequality and specialization, based on and operating through endogamous groups which taken together comprise a single complex society. In the anthropological discussions, caste system is sometimes referred to as the 'jati-varna' system which has two major facets. These are the endogamous group into which one is born (one's 'jati') and the broad group of occupations (meaning of the Sanskrit word 'varna' is colour which by extension refers to class) with which a jati is associated. Both these concepts can be ranked according to their social standing which is based on economic and political power.

Because of the history of each region and the differences between villages in a given region, local political and economic positions are not exactly equivalent even for the castes that may be considered to be of the same origin. In many instances, these local differences are distinctly marked. However, on the basis of questionnaires administered through panels of respondents, statistical methods have been developed for the determination of caste rank within a village (Mahar, 1959). In this section, we shall describe this caste-ranking of sample households in the study villages and examine the correlation between caste ranking and landholding status.

3.2.4.1. Caste-Ranking

Let us first consider the major caste groups existing in these villages which is shown in tables 2.4.1. The traditional occupations corresponding to each caste (given in the parentheses) are described.

In the ICRISAT village studies, caste codes along with three different caste ranks are given:

VSDCAST - V. S. Doherty caste rank for the i-th household
JHBCAST - Behrman caste rank for the i-th household
JGRCAST - J.G Ryan caste rank for the i-th household

While VSDCAST is based on overall social, religious and economic standing of sample households of different castes in the village (a slightly greater weight was given to religious rank), JHBCAST is based on the rank ordering of the relative frequency with which households of different castes appear in the sample. JGRCAST is, however, based on inspection of descriptive data on occupation and socioeconomic condition of individual castes reported by field investigator. Because of the comprehensive nature of the ranking, we shall follow the latter according to which the sample households are divided into four caste groups, namely, caste 1, caste 2, caste 3 and caste 4. The ranking of different castes, according to JGRCAST, is shown in table 2.4.1'.

Let us examine how these caste categories 1, 2, 3, 4 are distributed between small (TYPE = 0) and large (TYPE = 1) farms as shown in table 2.4.1". It shows that in all the study villages, a greater proportion of larger farms come from higher caste groups, namely caste 1 and caste 2. In other words, there appears to be a close association between caste-rank and landholding status in the study villages today.

3.2.4.2. Caste-Ranking (JGRCAST) and Land-holding Status : Some Tests of Association

In order to examine the association between JGRCAST and landholding status (TYPE), chi-square test-statistics[20] between TYPE and JGRCAST are computed. Values of these statistics are shown in table 2.4.2.

Critical value of chi-square with degrees of freedom equal to three is 11.345 at 1%

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[20]For a description of the tests of independence, see appendix two.

level of significance and 7.815 at 5% level of significance. Hence, all the computed chi-square statistics are significant at 1% and 5% levels of significance. These, therefore, suggest that there is a close and statistically significant correlation between landholding status (TYPE) and caste-ranking (JGRCAST) in all the study villages. In other words, larger farmers, in the study villages, belong to the higher castes as well.

Conclusion

This chapter has described the significance of the data-set to be used in the empirical analysis of the following chapters and the characteristics of the study village. We have also discussed the distribution of land and non-land resources in the study villages. On this question, the primary findings of the chapter are as follows.

(i) There is a positive correlation between land ownership and land quality/value; this does not invalidate the use of land area as an index of land endowment, although it does mean that land area alone underestimates the extent of inequality in land ownership.

(ii) Large farmers not only own more non-land resources, but they also own more non-land resources per acre; again this means that land assets can be used as a proxy for total productive resources, if necessary. It also means that land assets underestimate the true extent of inequality in the ownership of productive resources.

(iii) There is a strong correlation between land ownership and income per household.

(iv) There is a strong correlation between caste and landownership as well.

The analysis of this chapter, therefore, justifies the use of land ownership or landholding status as a classification criterion. In particular, the larger farms in the study villages are found to be the wealthier farms while the smaller farms are the poorer ones.

CHAPTER 3: TABLES

TABLE 1.2. Agro-Economic Characteristics of the Study Villages

Variable	Aurepalle	Shirapur	Kanzara
Population Density [1]	167	110	156
Literacy [2]	25.3%	41.4%	42.70 %
Family Size [3]	6	7	6
Total Area	16.29 ha.	14.72 sq km.	5.96
Cultivable Land(ha.)	11.8	1327.46	539.61 ha.
Irrigated Land [4]	20%	10.49%	3.75%
Irrigation Source	Tank, Wells	Wells	Wells
Rainfall (mm.) [5]	653	597	995.24 MM.
Soil Types	Red soil	Black soil	Black Soil
Major Crops	Sorghum, Castor,	Sorghum,	Cotton, Sorghum,
-	Pearl Millet, Paddy	Pigeon Pea,	Mung, Ground Nut
-	Pigeon Pea	Wheat, Pulses	-
-	-	-	-
Major Season [6]	Kharif (82%)	Rabi (64%)	Kharif (51%)
Crop Income [7]	48%	34-46%	53.40%
Labour Income	20%	43%	25.30%

Note : [1] Persons per sq. km. [2] Literacy measures the % of people who has gone to school. [3] Average family size in these villages. [4] % of total cropped area irrigated. [5] Average annual rainfall in the village. [6] Principal agricultural seasons observed are the kharif (June to September), the rabi (October to January) and the summer. However, the number of plots cultivated in the summer is negligible in all the villages. [7] Crop income is calculated as a percentage of net household income.

TABLE 1.2.3. Incidence of Tenancy in the Study Villages

Village	Owner Operated	Share-Cropped	Fixed Rent
Aurepalle	96.4%	0.5%	3.1%
Shirapur	64.5%	35.5%	0.0%
Kanzara	83.9%	12.3%	3.8%

Source: Walker and Ryan, 1990
Note : Figures refer to eight cropping years, 1975-76 to 1982-83.

TABLE 1.3. Classification of Sample Farms in the Study Villages

Landholding Class	Aurepalle	Shirapur	Kanzara
Small Farmer (1)	0.2 - 1.2	0.2-2.0	0.2-1.8
Medium Farmer (2)	1.2-3.2	2.0-5.3	1.8-5.3
Large Farmer (3)	> 3.2	> 5.3	> 5.3

Note : These figures refer to the operational size (in acres) defined as the area of owned land minus the area cash-rented or share-cropped out plus the area cash-rented or share-cropped in 1974/75.

TABLE 2.1.1. Ownership of Land in the Study Villages, 1980-84

Village	AGGCULT	AGGIRR	MPLOTVAL	NPLOT	NO. OF OBS.
Aurepalle	9.16 (7.92)	1.57 (2.83)	5.89 (2.95)	5.31	148
Shirapur	15.18 (13.06)	1.32 (2.10)	9.00 (3.60)	7.33	131
Kanzara	14.06 (17.73)	1.70 (3.63)	4.52 (2.29)	5.46	147

Note : Values in each cell refer to mean and standard deviation (in parentheses) of the relevant variable.The definition of these variables is described in section 1 of the chapter. To repeat, AGGCULT, AGGIRR are respectively the total area (in acres) cultivated and irrigated by a sample household

TABLE 2.1.2. Mean and Standard Deviation of the Area Cultivated, 1980-84

Village	Small Farms	Large Farms
Aurepalle	4.24 (3.33)	13.23 (8.32)
Shirapur	11.65 (11.95)	17.98 (13.31)
Kanzara	5.37 (6.51)	19.10 (20.11)

Note: Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.
Small Farms : Labour households + Small Farmers
Large Farms : Medium + Large Farmers.

TABLE 2.1.2'. Mean and Standard Deviation of Area Irrigated, 1980-84

Village	Small Farms	Large Farms
Aurepalle	0.20 (0.51)	2.71 (3.40)
Shirapur	1.10 (1.86)	1.50 (2.26)
Kanzara	0.04 (0.27)	2.67 (4.28)

Note : Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.

TABLE 2.1.2". Plot-wise Differences in Soil Quality among Sample Farms, 1980-84.

Soil Type	Aurepalle		Shirapur		Kanzara	
	I	II	I	II	I	II
Deep Black	*	*	31.4%	15.4%	2.5%	8.9%
Medium Black	*	14.4%	38.6%	34.2%	93.3%	84.1%
Medium to Shallow Black	8.1%	31.5%	15.4%	39.0%	*	7.0%
Shallow Red	87.6%	51.5%	*	*	4.2%	*
Gravelly	*	1.9%	13.0%	10.5%	*	*
Problem Soil	4.3%	0.7%	1.4%	0.5%	*	*
Others	*	*	0.3%	0.3%	*	*

Note : I ⇒ Small farms; II ⇒ Large farms. Also, note that each frequency refers to the average proportion of plots in each soil category held by the farms in the respective landholding classes.

TABLE 2.1.2''. Mean and Standard Deviation of the Plot Value Per Acre in Rs. 100 at 1960-61 Prices, 1980-84

Village	Small Farm	Large Farm
Aurepalle	4.03 (1.42)	7.43 (3.01)
Shirapur	8.34 (2.94)	9.67 (3.97)
Kanzara	3.29 (1.50)	5.25 (2.36)

Note : Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.

TABLE 2.1.2"". Theil's Inequality Indices in the Distribution of Land in the Study Villages

Theil's Index	Aurepalle		Shirapur		Kanzara	
	AGGCULT	AGGIRR	AGGCULT	AGGIRR	AGGCULT	AGGIRR
T	0.34	0.24	0.36	0.27	0.59	0.28
L	0.66	*	0.51	*	0.63	*

Note : Definition of Theil's indices are given in Appendix 1.

TABLE 2.2.1. Value of Own Bullocks at 1960-61 Prices, 1980-84

Villages	Small Farms		Large Farms	
	Total Value	Value per Acre	Total Value	Value per Acre
Aurepalle	212.93 (217.16)	10.45 (4.49)	865.81 (986.83)	11.76 (0.65)
Shirapur	611.05 (773.88)	25.68 (7.62)	551.21 (528.66)	76.47 (29.17)
Kanzara	86.41 (138.67)	12.50 (0.73)	601.26 (642.76)	17.57 (0.79)

Note: Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.

TABLE 2.2.1'. Use of Own-Bullocks in Family Farming, 1980-84

OBUL = 1	Aurepalle		Shirapur		Kanzara	
	I	II	I	II	I	II
Frequency	41.8%	65.4%	38.6%	67.6%	27.8%	82.6%

Note : OBUL is as defined in section one of the chapter. I ⇒ Small farms; II ⇒ Large farms

TABLE 2.2.2. Value of Farm and Non-Farm Equipments in Rs. at 1960-61 Prices, 1980-84

Village	Small Farms		Large Farms	
	Total Value	Value per Acre	Total Value	Value per Acre
Aurepalle	109.47 (152.40)	31.41 (4.68)	1758.79 (5641.97)	180.11 (50.17)
Shirapur	248.22 (374.79)	77.54 (57.11)	398.35 (569.69)	144.59 (46.80)
Kanzara	71.99 (85.63)	23.21 (5.01)	932.34 (1206.41)	58.17 (8.32)

Note : Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.

TABLE 2.2.3. Value of Financial Assets in Rs. at 1960-61 Prices, 1980-84

Village	Small Farms		Large Farms	
	Total Value	Value per Acre	Total Value	Value per Acre
Aurepalle	13.30 (26.91)	6.12 (2.69)	226.63 (540.19)	16.99 (3.41)
Shirapur	209.00 (357.54)	54.82 (17.73)	390.40 (733.76)	93.98 (24.17)
Kanzara	69.86 (321.94)	16.25 (10.78)	357.98 (882.94)	12.86 (3.47)

Note : Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.

TABLE 2.3. Household Income in Rs. at 1960-61 Prices, 1980-84

Variables	Aurepalle	Shirapur	Kanzara
I	1741.98 (1370.73)	2201.66 (3035.26)	1373.18 (834.47)
II	6086.17 (7728.78)	3324.89 (3442.47)	4144.71 (4373.47)
All Farms	3877.50 (5933.88)	2746.98 (3282.41)	2745.35 (3430.96)

Note : I ⇒ Small farms; II ⇒ Large farms. Values in each cell refer to the mean and standard deviation (in parentheses) of the relevant variable.

TABLE 2.3'. Theil's Inequality in the Distribution of Income Per Household, 1980-84

Theil's Index	Aurepalle	Shirapur	Kanzara
T	0.66	0.53	0.51
L	0.63	0.67	0.45

Note : For definition, see Appendix I.

TABLE 2.4.1. Description of Castes in the Study Villages

Aurepalle	Shirapur	Kanzara
Brahmin (Priests)	Maratha (Farmers)	Maratha (Farmers)
Reddy (Farmers)	Kosthi (Weavers)	Kunbi (Farmers)
Velama (Farmers)	Wani (Merchants)	Gosavi (Priests)
Padmasale (Weavers)	Mali (Farmers)	Mali (Farmers)
Bogama (Dancers)	Dhangar (Shepherds)	Muslim (Farmers)*[3]*
Katika (Butchers)	Muslim (Farmers)	Sonar (Gold-Smiths)
GOWDA (Toddy Tappers)	Mahar (Labourers)	Kumbhar (Potters)
Wadla (Carpenters)*[1]*	Huler (Labourers,Sweepers)	Navhi (Barbers)
Chakli (Washers)	*	Parit (Washers)
Kurma (Shepherds)	*	Kaikadi (Basket-Makers)
Mala (Farm Labourers)	*	Mahar (Farm Labourers)
Madiga (Farm Labourers)*[2]*	*	Mang (Farm Labourers)*[4]*

Note : [1] Sometimes, Wadlas work as blacksmiths as well.
[2] Traditionally, Madigas are the leather workers; they remove dead cattle from the village. Most work as agricultural labourers. A few are village watchmen.
[3] Muslims are also found to work as government servants.
[4] Mangs are also the traditional musicians in the village.

TABLE 2.4.1'. J.G.Ryan Caste-Ranking (JGRCAST)

Aurepalle		Shirapur		Kanzara	
Caste	JGRCAST	Caste	JGRCAST	Caste	JGRCAST
Brahmin	*1*	Maratha	*1*	Maratha	*1*
Reddy	*1*	Kosthi	*1*	Kunbi	*1*
Velama	*1*	Wani	*2*	Gosavi	*2*
Padmasale	*2*	Mali	*2*	Mali	*2*
Bogama	*2*	Dhangar	*3*	Muslim	*2*
Katika	*2*	Muslim	*4*	Sonar	*3*
Gowda	*3*	Mahar	*4*	Kumbhar	*3*
Wadla	*3*	Huler	*4*	Navhi	*3*
Chakli	*3*	*	*	Parit	*4*
Kurma	*4*	*	*	Kaikadi	*4*
Mala	*4*	*	*	Mahar	*4*
Madiga	*4*	*	*	Mang	*4*

Note : JGRCAST is the J.G Ryan caste rank for the i-th household. JGRCAST is based on inspection of the descriptive data on occupation and socio-economic condition of individual castes reported by field investigators. Accordingly, sample households are divided into four caste groups, namely, caste 1, caste 2, caste 3 and caste 4.

TABLE 2.4.1". Distribution of Castes among Small and Large Farms

JGRCAST [1]	Aurepalle			Shirapur			Kanzara		
	I	II	All	I	II	All	I	II	All
CASTE 1	*	43.513	22.7	39.1	82.6	60.9	*	40.0	18.24
CASTE 2	*	.0	6.8	4.3	4.3	4.3	45.8	40.01	3.213.
CASTE 3	38.161	30.413	34.1	34.821	13.0	23.9	16.6	0.010.	6
CASTE 4	.9	.0	36.4	.7	*	10.9	37.5	0	25.0

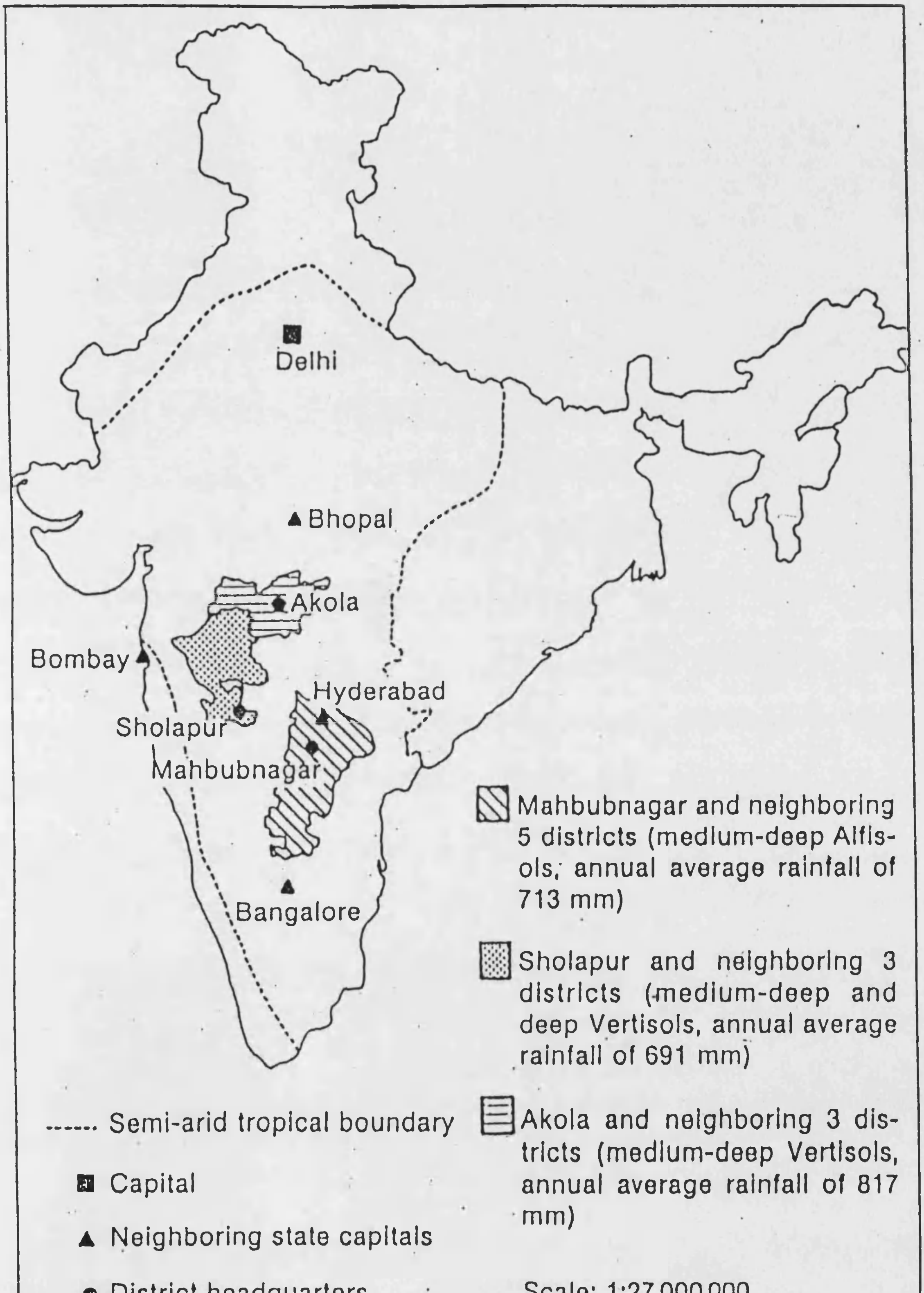
Note : The figures are given in per cent; I ⇒ Small Farms ; II ⇒ Large Farms.
[1] This caste ranking corresponds to J.G.Ryan caste ranking.

TABLE 2.4.2. Caste Ranking and Farm Size : Chi-Square Test Statistics

Test-Statistics	Aurepalle	Shirapur	Kanzara
Pearson (χ^2)	19.27 (3) [1]	10.84 (3)	12.86 (3)
Likelihood Ratio (χ^2)	24.74 (3)	12.94 (3)	16.29 (3)

Note : For the description of the tests, see Appendix 2.
[1] Degrees of freedom is given in the parentheses.

Location of the Study Villages



CHAPTER 4. CASUAL AND REGULAR CONTRACTS : SOME ASPECTS OF LABOUR AND CREDIT MARKETS IN RURAL INDIA

Introduction

Our theoretical analysis suggests that the choice between casual and regular contracts in rural India is closely related to the conditions prevailing in the labour and credit markets. This chapter sets out to examine rural labour and credit markets in the study villages, set within the larger Indian context. Section 4.1 studies the structure and composition of the labour markets in India while section 4.2 focuses on labour markets in the study villages. Section 4.3 takes a brief look at the demand side, before we move on to examine the supply side of the labour market in section 4.4, which, among other things, provides estimates of participation and unemployment rates to be used later in the chapter. Section 4.5 examines the wage and employment considerations involved in casual and regular labour contracts, while section 4.6 examines the availability and cost of rural credit to landed and landless labourers in the study villages. The chapter ends with a brief summary of our findings.

4.1. Rural Labour Markets in India

The discussion in this section is divided into two sections. Section 4.1.1 discusses the structure and composition of rural labour markets in India, while section 4.1.2 discusses their characteristic features.

4.1.1. Structure and Composition

Agriculture and related activities (forestry, fishery, hunting etc.) form the main source of rural employment; in 1977-78, 80% of the male work force and 86% of the female work force were engaged in agriculture. Apart from agriculture, it is manufacturing, mining, retail and wholesale trade and personal and community services which contribute to rural employment. Both agricultural and non-agricultural activities involve self-employment as well as wage employment.

The National Sample Survey (NSS) reports the composition of rural workers in India as shown in table 1.1. The majority of main and marginal workers in rural India are self-employed. Next in importance comes wage employment, where the importance of casual farm and non-farm employment is overwhelming as compared to regular farm employment. Male labourers dominate in the regular market while female participation is relatively higher in the casual labour market.

Secondly, the distribution of agricultural labour between family and hired labour is considered (table 1.1'). Family labour predominates in traditional agriculture; it contributes to 69.3% of total labour. 25.3% of total labour is contributed by casual labour. Only 5.4% of total labour is supplied by regular labourers who are predominantly male.

However, the pattern of labour use varies across regions according to the nature of the crop produced. Reddy (1985) observes that in the Amaravati district of Maharashtra 64%-86% of the total labour force are hired labour while Rudra (1973) observes that the figure varies between 40% and 86% in West Bengal.

4.1.2. Characteristic Features of Rural Labour Markets in India

Casual labour is the most dominant type of hired labour contract. The search for casual labourers is usually carried out by the employers or the wives of the employers, most commonly in the evening before the work has to begin. In general, three forms of wage payments, namely, daily wages, piece-rate wages and harvest shares[1] prevail in these villages.

Rudra (1982a) has studied the types of casual labour contracts prevailing in a few eastern states of India which is based on the Survey of Agrarian Relations, 1975. Table 1.2 taken from Rudra (1982a) suggests that a large proportion of casual labourers are hired on a daily basis. However, many casual labourers may enter some informal arrangements with the employers to work for a number of days in succession. However, given the costs of supervision, piece-rate contracts are gaining popularity, especially in certain regions.

A common feature of the casual labour markets in India is the pronounced seasonality of production and employment (Reddy 1985; Drèze & Mukherjee, 1987). Seasonality of employment is found to be closely related to the seasonality of different agricultural tasks performed during the production cycle. Usually, periods of harvesting and

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[1]In the case of contracts based on harvest shares, workers receive a fraction of the harvest products; this fraction varies from one region to another.

post-harvesting constitute the peak period when labour demand goes up in the villages. Using NSS data, seasonal fluctuations of rural employment among male and female labourers in India are shown in table 1.2'. NSS data reports wage and employment conditions for male and female labourers in rural India during the four quarters of the year. Male farm employment is found to be the highest from October to December while female farm employment is the highest from July to September. Daily casual farm wages also vary across quarters, being the highest during the quarter of July-September.

Involuntary unemployment in the casual labour market is common, especially in the slack season (see footnote 12 and also the discussion in section 2.2.4 of chapter two). Rudra (1982a) observes that less productive workers are more vulnerable to becoming unemployed. However, there is a given daily (casual) wage which is downward rigid for a given sex which displays very little seasonality. This has been widely observed in different parts of India (Rodgers, 1975; Bardhan & Rudra, 1981; Rudra, 1982a; Rao, 1984; Drèze & Mukherjee, 1987). In fact, Rudra (1982a) has presented strong evidence that even in the face of unemployment, undercutting wages is rare in the villages in West Bengal; this has generally been caused by a strong feeling of solidarity among the labourers. However, piece-rate wages vary across tasks and across individuals (Drèze & Mukherjee, 1987).

Male-female discrimination is pronounced among the casual labourers which is primarily related to the nature of tasks performed. Vaidyanathan (1986) offers some evidence in support of this observation as shown in table 1.2". While male labour content is relatively higher in ploughing and sowing, female labour content is higher in transplanting, weeding and harvesting. A similar trend is noted in some micro-studies as well. For example, Rudra (1982a), Reddy (1985) and Drèze and Mukherjee (1987) have all observed that compared to men, casual women labourers dominate in tasks like transplanting, weeding and harvesting. In addition, table 1.2' shows that the daily female farm wage is less than that of the male wage in every quarter. A part of this is attributable to the differences in the nature of tasks men and women perform; sometimes, women receive a lower wage than men, even for the same operation.

Long-term attached (regular) labour contracts, sometimes known as labour-tying, are prevalent in different parts of India. The number of regular farm jobs available in a village is limited; they fulfil large farmers' need for hired labour. Given the seasonality of labour demand, large farmers hire a few regular farm servants while meeting the rest of their labour demand by hiring casual labourers. Employment of regular labourers only is wasteful since the demand for labour may be lower in some slack periods. Predominantly, male members and individuals from poor and lower castes in the village participate in the regular job market.

Contracts are usually agreed on for the whole production year or for a particular crop season. Contracts can be renewed after a year if both parties agree. Wages are usually agreed on for the whole period of the contract. One can refer to Rudra's (1982a) findings from different districts in West Bengal in 1974 as shown in table 1.2'''. It follows that the annual contract is the most common type of regular contract in rural West Bengal.

Regular farm servants are usually paid in a few instalments over the period of the contract. They are paid in kind or cash or in both cash and kind; however, there are no standard regular wages in a village. Regular wages vary from one farm to another and also from one individual to another, even among those employed by the same farm.

Rural labour markets in India, both casual and regular, are largely closed (Rudra, 1982a; Bardhan & Rudra, 1986). Inter-village labour mobility in the neighbourhood is rare. The main form of labour hiring across villages is in terms of labour migration (Breman, 1985; Mukhopadhyay, 1987). Labour migration takes the form of moving from less prosperous areas to the more prosperous ones.

One of the most extensive micro-level studies on intra-rural labour circulation is done by Breman (1985) in some villages in south Gujrat. He has found a significant increase in the number of migrant agricultural labourers, especially moving from the tribal hinterland of Surat district into the prosperous plains of southern Gujrat. He has argued that this recent upsurge in the use of migrant labour has been caused by the deliberate policy of landowners not to employ local landless labourers, raising unemployment and underemployment in the locality. Landlords find that migrant labourers are not only more hard-working, but also more docile than the local labourers. Oberoi and Singh (1980) have, however, found that landowners in Punjab compete with each other for the available migrant labourers in order to meet the local labour scarcity in the peak seasons.

Using 1981 Census data, Mukhopadhyay (1987) focuses on the rural-to-rural migration of labourers; she finds that inter-state migration for employment is more common (table 1.2""); 'distance seems to be a lesser deterrent of this mobility than is normally presumed'.

4.2. Labour Markets in the Study Villages

Agriculture is the primary source of income in all three study villages. Crop revenue is the most important source of income (49% of total average household income in Aurepalle is earned from crop production; the corresponding figures are 34% in Shirapur and 53% in Kanzara). Next to crop revenue, labour income occupies the second place in terms of share in total income in all the study villages (20% in Aurepalle, 42% in Shirapur and 25% in Kanzara)[2]. In the light of our discussion in section 4.1, this section highlights the composition and characteristics of the labour markets in the study villages.

4.2.1. Structure and Composition

The hired labour market in each of the study villages is divided between agricultural and non-agricultural jobs. While agricultural labour demand is related to the production of different crops in the village, non-agricultural job opportunities come from a number of different sources, the most common sources being construction work in the village, local factories (for example, location of the Sholapur textile factories in the vicinity of Shirapur generates demand for unskilled labour from Shirapur), and government projects on public utility services (for example, initiation of a canal work near Kanzara). Jobs in either field can be identified as regular or casual[3].

Casual farm jobs can be daily-rated or piece-rated in different types of farm operations like transplanting, weeding, harvesting or post-harvesting. In some cases, contracts are agreed on for shorter periods, varying between a single day to at most a week. Payment is made per day for an agreed number of hours of work. The other type of casual labourers are paid on a piece-rate basis for a specified job, say, transplanting a plot of land. 'Daily earnings are generally higher from contract work (piece rate) compared to daily rated jobs, but the latter often involves longer hours and/or more strenuous work' (Walker & Ryan, 1990). However, the farmer's incentive is that the cost of supervision is minimised by the very nature of the piece-rate contracts, thus they are willing to pay a higher wage to piece-rate workers (Drèze & Mukherjee, 1987). The availability of jobs in the daily labour market is usually impersonal in nature; but the access to contract work (piece-rate work) usually operates through personal contacts with the contractors.

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[2]Source : Asokan, Rao and Rao (1991), Bhende (1983) and Kshirsagar (1983).

[3]Members of the sample households who are aged 6 years or above, and who offer labour for farm and/or non-farm activities are designated as casual labourers (see section 3.1 in chapter three).

There are also a few *regular farm jobs* available in these villages. Besides a few domestic servants (usually women and boys) in the wealthy households, men are exclusively employed as regular farm servants in all the study villages. The employers of regular farm labourers and domestic servants are usually wealthier and larger farm households. Regular farm servants fulfil the large farmer's need for regular hired help. They mainly look after the livestock[4] and plough and cultivate the fields.

Non-farm casual jobs are usually organized on a piece-rate basis by the government agencies or via contractors. These are especially significant in Shirapur and Kanzara. However, *non-farm regular job opportunities* are really limited in the village. They include a minority of salaried individuals in the village like a teacher in the village-school, a post-man in the Post-Office or a night-watchman in the village.

According to their primary occupation[5], individual members of the sample households (whose age is between six and sixty years) can be classified into the following four categories.

(i) *Self-Employment.* It includes employment in own farm cultivation, rural crafts, traditional caste occupations, trading etc.

(ii) *Casual Employment.* It includes employment in agricultural labour and other casual employment in farm or non-farm activities.

(iii) *Regular Employment.* It includes employment in regular farm work, livestock rearing and other regular profession or service jobs.

(iv) *Others.* It includes other categories of involvement like going to school or college, domestic work etc.

Over the ten-year period (1975-84), self-employment continues to be the most important source of employment in the study villages. It constitutes about 40% of total employment in Aurepalle, 39% in Shirapur and 51% in Kanzara. Next in importance comes wage employment which includes both casual and regular employment in farm and non-farm activities. Compared to regular employment, the importance of casual employment is higher in all the study villages which is similar to the trends observed in other parts of India. However, an inter-village comparison shows that the relative importance of regular employment is higher in Aurepalle than that in Shirapur or Kanzara.

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[4]Usually younger regular farm servants in the study villages look after the livestock who may not participate in cultivation. We, however, consider those who take part in farm cultivation.

[5]The primary occupation includes cultivation, agricultural labour, casual labour, livestock rearing, trading, rural crafts, traditional caste occupations, attached labour, profession or service, domestic work and others like going to school or colleges etc.

Secondly, there is a marked distinction between male and female labourers in these villages which is closely related to the nature of the tasks performed. Only harvesting and threshing are performed by both men and women labour. With respect to other tasks, there is significant segmentation. While transplanting and weeding are predominantly performed by women labourers, tasks involving bullock power (e.g., ploughing, irrigation etc.) are performed by men. On an average, the daily female wage is lower than the daily male wage in the casual labour market. Relative dominance of female labourers is higher in the casual labour market. Male are primarily engaged in self-employment (which includes own farm cultivation among other things) or in regular farm jobs in the study villages.

Walker and Ryan (1990) reports that there has been a positive and significant time trend in Aurepalle and Shirapur (the trend is not significant in Kanzara) for both male and female casual wages over 75-76 and 83-84. The trend is obvious in Shirapur where there was significant increase in off-farm labour demand during this period. In Aurepalle, however, we do not find any such obvious evidence of enhanced labour demand. It seems that this upsurge in real wage is more a reflection of supply shift where people significantly switched to different kinds of self-employment including various caste occupations so that labour supply decreased, thus causing real wage rate to rise. Interestingly, male-female wage differential has narrowed down in both Aurepalle and Shirapur; women in Shirapur have positively gained from the equal pay provision of the Maharashtra Employment Guarantee Schemes.

4.2.2. Characteristic Features

As in other parts of India, regular jobs in the study villages are limited in number; only a few wealthy households in these villages employ regular farm servants. Regular wages vary among farms and among individuals employed by the same farm. A particular feature of the wide variation of the annual regular wage among different farmers in the same village is very interesting; during the resurvey of Aurepalle in 1991/92, it came out from our informal discussion with farmers as well as labourers that larger farmers who do not supervise their regular farm servants closely, usually pay a lower cash wage. The difference in farm size, thus, generates a dispersion in regular wages prevailing in the village. However, medium farmers usually hiring one/two regular farm servants (as compared to large farmers hiring upto five to six regular farm servants at times) supervise them closely, but usually pay a higher annual wage. Labourers, however, generally prefer to work for the generous/rich employers in the village because the additional harvests they manage to get from these employers more than compensate for the lower wage.

The regular labour market is free from the hereditary patron-client relationship between labourers and employers. This has clearly been brought out in our interviews with the regular farm servants in Aurepalle. Labourers who were satisfied with the present employer were considering renewing their contract at the end of the current year. However, there were those who chose regular farm contracts because they wanted to have access to a source of credit; they planned to change jobs as soon as they were free of debt. There were others who left previous employers because they had problems with the employer or some other colleague.

A majority of labourers (landed/landless) are engaged in casual farm/non-farm jobs during the year. Casual labour contracts can be of different types : (a) daily contract, (b) piece-rate contract, (c) group contract. (c) is a variant of (b) where a group of labourers is contracted at the piece rate; different types of contract are usually related to different agricultural operations for different crops. In the slack season when job prospects are bleak, some individuals move into self-employment and take up different caste occupations. For example, Gowdas in Aurepalle get into toddy-tapping.

The following features of the labour market in the study villages can, thus, be summarised :

(1) The labour market is divided between casual and regular contracts; casual contracts may be of two types, namely, daily and piece-rate contracts.

(2) Males dominate in the regular labour market while female wage labour is concentrated in the casual labour market.

(3) Regular wages vary across individuals and farms in a village. Usually, the closer the supervision by the employer, the higher is the wage offered. Moreover, regular wages may even vary among the labourers hired by the same employer. A part of this variation may be attributed to the experience of the workers where more experienced workers receive higher wages.

(4) Usually, a major portion of regular wages are paid in advance while the rest is paid at regular intervals throughout the contract period.

(5) Casual wages are usually paid daily or in piece-rates. Daily earning from the piece-rate contract tend to be higher than daily earnings from daily-wage contracts, though the intensity of work in the former is also greater.

(6) There is a definite discrimination against female casual labourers in the study villages such that female wages in all tasks are usually lower than that of male wages.

(7) Casual unemployment goes up in the slack period of agricultural production; however, the extent of unemployment varies among the study villages according to the availability of alternative employment opportunities.

(8) Labour markets are largely closed in the study villages, in the sense that inter-village hiring is uncommon. However, some in-migration from the surrounding less-prosperous areas takes place in Kanzara.

4.3. Aspects of Labour Demand

Farm households in all the study villages rely significantly on hired labour. 'In Mahboobnagar and Akola villages, hired labour provides the lions' share (60 to 80 per cent) of total labour use in crop production' (Walker & Ryan, 1990).

This section examines different aspects of labour demand in the study villages. In particular, the variation in the pattern of labour hiring between small and large farms, especially with respect to the relative content of family and regular labour (section 4.3.1), the seasonal fluctuations of labour demand (section 4.3.2), and crop failure in the semi-arid tropics (section 4.3.3) are highlighted.

4.3.1. Family Versus Hired Labour

As noted earlier, both males and females are hired as casual labourers while only males are employed as regular farm servants. A few wealthier farmers hire regular farm servants for long periods of time, while casual labourers are employed by all types of farming households. This closely follows the trend observed in different parts of India. The rest of the labour is supplied by the family labour.

Information about labour hiring[6] is obtained from VLS-Y2. In order to examine the nature of labour hiring, the ratios of regular labour-hours to total labour-hours (PL/TL) and that of family labour-hours to total labour-hours (FL/TL) are calculated for all crops.

Table 3.1 presents the average values of PL/TL and FL/TL in the sample farms

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[6]Most sample farms/households may be involved in both hiring-in and hiring-out of labour. However, usually this holds good for casual labourers only; farms may hire-in some casual labour in the busy seasons while some family members may hire themselves out if there is not much work to be done on the family farms. So far as hiring-in and hiring-out of regular labourers are concerned, there is a segregation: usually larger farmers hire-in regular labourers and landless households hire themselves out as regular labourers.

hiring regular farm servants over the study period 1980-84. For each column, the numbers in parentheses indicate the corresponding figure when all farms are considered. In general, the probability of hiring regular labour in the study villages is higher in larger[7] farms than that in smaller farms; in Aurepalle and Shirapur, a few smaller farmers also hire regular farm servants, though the proportion is much less than that on the larger farms. This is true whether we consider all farms or only the farms hiring regular labourers, though the difference is larger for the sub-sample of farms hiring regular labour. A comparison of labour use between all farms and farms hiring regular labour suggests that the average use of regular labour-hours is lower among the larger farms if all farms are taken into account.

Secondly, the use of family labour-hours among the sample farms is considered. Pooling all sample farms together, the average use of family labour-hours is higher in smaller farms as opposed to the larger ones (the difference is significant, too). In general, it appears that there prevails a substitutability between the use of regular and family labour in these farms, i.e., the average use of family labour-hours is higher in the smaller farms, who hire less of regular labour-hours. Next we consider the use of family labour-hours among the farms hiring regular labourers. There are no small farms in Kanzara hiring regular labour-hours while smaller farms in Aurepalle use more family labour-hours (and less regular labour-hours). However, the average use of family labour-hours is lower among the larger farms (using regular labour) in Aurepalle and Kanzara so that we may argue that regular and family labour are substitutes in these villages. But in Shirapur, the average use of regular and family labour-hours are almost equal in larger farms (hiring some regular farm servants). It should, however, be noted that the average use of regular labour-hours is very low in Shirapur. In other words, there is no obvious relationship between the use of regular and family labour in Shirapur.

4.3.2. Seasonality of Labour Demand

As mentioned earlier, agriculture is the primary source of living in these villages. But agricultural production is found to be highly seasonal in this part of the semi-arid tropics of India. Labour demand not only fluctuates over the peak and the slack periods of production, but also among the study villages, due partly to the existence of different seasonal patterns in different villages.

The peak period is the period of buoyant agricultural activities. This is related to the

[7]This classification corresponds to the variable TYPE. See the description of the variables in chapter three.

timing of labour-intensive tasks like transplanting and weeding on the one hand, and harvesting and post-harvesting, on the other. However, the timing of these tasks depends on the nature of the crops produced which varies from one village to another. For example, due to the erratic rainfall pattern in the summer, rabi (winter) is the main crop in Shirapur. Hence, the labour demand, in Shirapur, is higher in the month of November when transplanting/weeding starts, and also in the months of February-March, when harvesting starts. However, kharif is the main crop in Aurepalle and Kanzara. Accordingly, the relative labour demand increases in these villages during July-August (transplanting and weeding) and then again in October-November-December (harvesting and post-harvesting).

One may argue that the seasonality of labour demand is reflected in the task-wise variation of daily wages. Rudra (1982a) argues that the task-wise variation of wages sometimes account for the demand for non-substitutable labour.

Finally, there is an inter-village variation in the demand for labour. Drought-prone Shirapur is the village worst affected by the variability of labour demand over the slack and peak periods while the situation is relatively stable in Kanzara. Given the seasonality of labour demand in agriculture, the availability of casual contracts in agriculture is specific to particular months in the year. Hence, in the slack season, there is a scarcity of casual farm jobs in these villages. At this time of the year, a casual labourer may opt for some non-farm job, provided s/he can secure one. However, the availability of non-farm casual jobs is limited and rather village-specific (see discussion in chapter seven).

4.3.3. Crop Failure

Besides seasonal fluctuations, crop failure is another hazard prevalent in the semi-arid tropics of India which is sometimes responsible for the diminution of labour demand. The problem may be more acute if there is a general crop failure rather than failure in some specific crops of the locality. In order to avoid complete crop failure, farmers in the semi-arid study villages often adopt to intercropping which significantly reduces the possibility of complete crop failure in the drought-prone area. In this case, farmers cultivate a combination of different crops (usually two-three crops at a time) on the same plot of land in different rows so that even if production of one crop fails, there are still others to survive. Among the three study villages, crop failure is particularly frequent in the Sholapur villages. On an average, 11% of the cropped area suffers from complete crop failure which is more predominant in the sole cropping area as opposed to that in the intercropping area.

The problem with frequent crop failure is that it not only contributes to the fluctuations in crop income, but also to that in farm labour income. Hence, labourers/farmers need to hedge against the possible drop in their incomes by some other means.

Intercropping is a common way of hedging against volatility of crop production in all the study villages. For example, sorghum/pearl millet/pigeon pea or castor/pigeon pea intercropping in Aurepalle and cotton/pigeon pea/sorghum or pigeon pea/sorghum/green gram/ground nut intercropping in Kanzara are commonly practised. Kanzara is, however, in an advantageous position. Besides the relatively higher and more dependable rainfall pattern, cotton is a stable performer and there is a lower incidence of crop failure in Kanzara. The extent of intercropping is much higher in the smaller farms in their attempts to safeguard against the risk of crop failure as opposed to that in the larger farms. In other words, the extent of sole cropping is positively associated with the size of the operational landholding.

4.4. Aspects of Labour Market Participation

Participation in the labour market depends on a number of factors. It not only depends on the personal and family characteristics of the workers (determining his/her preference pattern), but also on the availability of work. In this section, the probability of participation, the probability of unemployment and the seasonality of employment are considered.

The analysis in this section primarily relates to casual labourers. This is because, by the very nature of the contract, regular labourers are supposed to work everyday except when they are sick. Hence, they are excluded from the analysis of participation and market unemployment.

4.4.1. Probability of Participation

Casual labourers have the freedom of participating in farm and/or non-farm work; the latter may include participation in some on-going government projects as well. One way to examine the nature of farm participation is to consider the probability of participation. Two measures are used here, namely, the probability of farm labour force participation (POL) and the probability of casual farm labour participation (POM) as follows :

$$POL = \frac{OWNFWD + FDAY}{OWNFWD + FDAY + NFDAY + GDAY + INUNEMP}$$
$$POM = \frac{FDAY}{OWNFWD + FDAY + NFDAY + GDAY + INUNEMP} \quad (1)$$

the difference between POL and POM is that the number of days worked on the labourer's own farm which is not included in POM.

where OWNFWD = no. of days worked on own farm;
FDAY = no. of days worked on others' farm;
NFDAY = no. of days worked on other non-farm work;
GDAY = no. of days worked on governmental project;
INUNEMP = no. of days involuntarily unemployed.

The average values of POL and POM for male and female casual labourers in the study villages during 1980-84 are shown in table 4.1. By definition, POL and POM are identical for landless labourers (both male and female) since they do not have the opportunity to work on their family farms. The difference between POL and POM is positive for landed labourers since they are required to work on their own plots. Secondly, POM is significantly higher for landless male and female labourers in all the study villages which, to some extent, lends support to our argument of time constraint that the opportunity cost of time is less for landless labourers. Thirdly, the probability of casual farm labour participation POM is the lowest in Shirapur and the highest in Aurepalle. This, perhaps, suggests that there are more non-farm work opportunities in Shirapur compared to Aurepalle where farming is the most important economic activity. Finally, we note that, on an average, casual female participation probabilities, POL and POM, are higher than those of male labourers, POM being even higher for landless female labourers. This points to the relative dominance of female labourers in the casual market.

4.4.2. Probability of Unemployment

Unemployment is pervasive among casual labourers, especially in the slack seasons. It not only varies among the male and female labourers, but also among the study villages. In order to examine the nature of unemployment, the probability of involuntary unemployment (PU) is calculated for each year during 1980-84 and also for landed and landless labourers. It is defined as the number of days an individual is unable to get employment out of the total number of days s/he has tried (where unemployment does not include the number of days worked on the individual's own farm). Estimated values of the PU are shown in table 4.2.

In general, the average probability of unemployment (PU) is higher for females in all the study villages with Shirapur being the exception[8]. Walker and Ryan (1990) have estimated the probability of unemployment for all six ICRISAT villages for the year 1975-76; they found that PU is 0.19 for men and 0.23 for women. Considering the five-year period (1980-84), our estimated PU figures are very close to their figures for male labourers in Aurepalle and Kanzara and for female labourers in Aurepalle and Shirapur; other figures, too, are close enough to be compared. It follows that the extent of unemployment among male and female casual labourers has remained almost unchanged over a period of ten years (1975-84).

Secondly, we compare the probability of unemployment between landed and landless labourers. The probability of unemployment is higher among landless labourers in all the study villages and is even higher for landless female labourers (though the difference is not significant). This may be related to the fact that female labourers are excluded from regular farm and/or most non-farm jobs in these villages.

Finally, considering the five-year period (1980-84), unemployment among both male and female labourers is found to be the lowest in Kanzara and the highest in drought-prone Shirapur. Thus, like participation, unemployment, too, is dependent on the characteristics of the village labour market.

4.4.3. Seasonality of Participation

Given the seasonal nature of agricultural production, participation/unemployment in the rural labour market, too, follows a seasonal pattern too. To analyse this seasonal pattern, we calculate the average monthly duration of unemployment (in days) in 1980 (one of the years under study; the choice of the year is arbitrary) for male and female casual labourers during different months of 1980 as shown in table 4.3.

The monthly duration of unemployment appears to be closely related to the pattern of seasonality of agricultural production, as indicated by the crop calendar of the respective villages. For example, female labourers primarily participate in tasks like transplanting, weeding and harvesting and the monthly duration of unemployment for female labourers is lower in the months of August and September (when the transplanting and weeding of the kharif crops are in operation) and then in November-December (when harvesting starts).

[8] The persistence of significant differences in both wage and unemployment probability between men and women reflects a strong gender division of labour. As mentioned earlier (see pp. 72 of chapter three), the gender division of labour is not a major focus of the study; this is in fact a much under-researched issue, which calls for further attention.

However, male labourers dominate in sowing, ploughing, irrigation (irrigation continues throughout the production process for the irrigated plant) as well as in harvesting; the duration of unemployment among male labourers is lower in the month of August, and then again in October and January. The pattern of monthly duration is similar in Kanzara because kharif is the main crop there.

The pattern of unemployment is, however, different in Shirapur. Given the erratic rainfall pattern in the village, rabi (winter) is the main crop. Accordingly, the duration of unemployment is lower in November (when transplanting-weeding goes on) and then again in January-February (when harvesting starts). Secondly, compared to Aurepalle and Kanzara, the general level of unemployment is higher in Shirapur. It is even higher among the female labourers throughout the year.

4.5. Wages and Employment in Casual and Regular Contracts

This section examines the wages and employment levels of casual and regular labourers and the underlying relationship between casual and regular contracts.

4.5.1. Casual and Regular Employment

By the very nature of the contract, a casual labourer has the freedom to combine different alternative activities. S/he can work on his/her own farm if s/he is a landed labourer or on another farm; s/he can also find employment in some non-farm or government projects. However, a full-time regular farm servant is attached to a particular employer for the contract period and does not have the freedom to work for others at all during this period. Hence, the total benefit from the regular contract comes solely from farmwork on the employer's land.

Basic information about wage and employment particulars of regular labourers is obtained from the VLS-C schedule while that relating to the casual labourers is obtained from the VLS-K schedule (see chapter three). Since regular labourers in the study villages were all found to be male, we compare the wage and employment conditions of regular labourers with male casual labourers only.

On an average, casual male workers in all the study villages have more days of work in farm employment (FDAY) than in other non-farm jobs (NFDAY) and/or governmental works (NFEMP), all of which add up to total employment (TOTEMP)[9]. In Shirapur and Kanzara, however, more days of casual work are found in non-farm and governmental employment as compared to Aurepalle (table 5.1). Shirapur has gained from substantial non-farm employment opportunities because of being in the vicinity of the Sholapur textile industry as well as receiving government support because the village comes under the Drought-Prone Area Program (DPAP). Kanzara has benefitted from a number of on-going projects primarily initiated by the Maharashtra Employment Guarantee Scheme of the state government (see further discussion in chapter seven).

A regular farm servant is attached to his/her employer for a stipulated period. The average period of contract is about a year in Aurepalle or Shirapur; however it varies between three to five months in Kanzara where regular farm servants are hired primarily for long-duration cotton cultivation. During the contract period, regular farm servants are supposed to work every day except the days when they are sick. Binswanger et al. (1984) have assumed that, on an average, a regular farm servant works for 25 days a month (which is 300 days a year). The difference in the days of employment also includes the difference in the number of hours worked a day. A casual worker works for 7-8 hours a day in all the villages while a regular farm servant usually works for a longer number of hours a day; the working day of a regular labourer varies between 10-12 hours, sometimes they work even longer, especially when irrigation work starts.

4.5.2. Casual and Regular Wages

Next, wage incomes between casual and regular contracts are compared. We calculate average village level male casual and regular wages at 1960-61 prices as shown in table 5.2. In Aurepalle, regular wages are mainly paid in kind[10] while in Kanzara they are predominantly paid in cash[11]. On the other hand, in Shirapur, a combination of wages paid in cash and kind is observed[12]. Regular wages usually vary among the farms in the study

[9]The number of days worked on the individual's own farm is excluded here.

[10]In Aurepalle, the permanent wage is usually paid in kind. 44.5 kg. of paddy per month plus one pair of sandals every year plus pinch of tobacco everyday. Some farmers also give a blanket every 2-3 years. Cash payments are nil.

[11]In Kanzara kind payment is negligible and most of the payment is made in cash. The range of cash payment varies from one farm to another.

[12]In Shirapur, we find a combination of cash and kind payments. Range of cash payments varies from one farm to another while the kind payment is fixed at 27.5 Kg. of sorghum per month.

villages; even in the same farm, different regular labourers may receive different wages. Bardhan and Rudra (1981) and Rudra (1982a) report that regular farm servants obtain a fixed wage which is personalised and varies from one farm to another in the same village. However, Breman (1974) and Sundari (1981) have observed village-specific rates for regular farm servants. Freeman (1977) finds that regular farm servants in Orissa are paid a share of the final product while Sundari (1981) and Rudra (1982a) find that usually regular wages include meals, clothes and other components.

It is instructive to compare daily wage earnings between regular labour (DPLWAGE) and casual labour (DCLWAGE). For convenience, we shall refer to these notions as the 'regular daily wage' and 'casual daily wage', respectively. All wages are calculated in rupees (Rs.) at 1960-61 prices (see chapter three). As shown in Table 5.2, the regular daily wage is substantially lower than the casual daily wage in all the study villages, the difference being minimum in Kanzara and maximum in Aurepalle. However, given the uncertainty of getting a casual job, the casual daily wage needs to be adjusted by the probability of employment. In doing so, casual daily wages are multiplied by (1 - u), where u is the probability of unemployment (see section 4.4 of the chapter). Even after this adjustment, the regular daily wage is lower than the casual (adjusted) daily wage in Aurepalle and Shirapur. In Kanzara, however, the unemployment-adjusted casual daily wage is very close to the regular daily wage. This means that, in Kanzara, the labourers' 'indifference condition' is satisfied, assuming no risk aversion and no credit constraints (see discussion in chapter two).

The comparison between casual and regular daily wages is somewhat misleading if we do not distinguish between landed and landless casual labourers. Landed casual labourers usually get some non-wage income as well as wage income. It may, therefore, be useful to compare regular daily wages with the daily wages earned by landless casual (male) labourers. We find that regular daily wages are lower than unemployment-adjusted casual daily wages of landless labourers (DCLWAGE') in all the study villages. This suggests that hypothesis H1 holds good for the landless labourers in the study villages. However, we do not have the information on the reservation wage of the workers; hence, we cannot examine the validity of hypothesis H3, i.e., whether regular daily wages are higher than workers' reservation wages.

Given that regular daily wages are lower than casual daily wages, we expect a risk-neutral landless male labourer to prefer casual employment. Hence, in order to explain the choice of regular contract by the landless labourers, we need to take into account: (i) risk aversion, (ii) credit constraint, and (iii) the possibility of non-farm wage income. While (i) and (ii) may encourage the choice of regular contracts, (iii) may have an adverse effect and may, therefore, induce the choice of casual contracts.

Total income from a regular job (TOTWAGE) comes from the farm work for the employer[13] while the total income from a casual job may come from farm as well as non-farm employment (which may include income from on-going government projects as well). The significance of non-farm wage income not only varies between landless and landed labourers, but also among the study villages (see table 5.2'). Compared to landed labourers, landless casual labourers have a higher proportion of total income earned from non-farm activities in all the study villages because they can offer more non-leisure time in the market and they are also more mobile[14]; the relative significance of non-farm income is the least in Aurepalle and the highest in Shirapur. As shown in table 5.2, regular labourers in all the study villages earn more than the casual annual wages earned from farm work. However, as shown in tables 5.2 and 5.2', the situation is reversed when the non-farm incomes are added to farm income to yield the total casual income (TOTCWAGE) earned in a year.

A comparison of Aurepalle with Shirapur and Kanzara shows that regular labourers in Aurepalle are the poorest[15], having the lowest daily income. To some extent, this may be explained by the lack of alternative employment opportunities in Aurepalle, giving rise to a lower reservation wage of the workers. Aurepalle does not have any alternative source of non-farm demand for labour like the government-operated land improvement or irrigation projects near Kanzara, Shirapur or the location of Sholapur textile industry in the neighbourhood of Shirapur[16]. In the absence of other alternative employment opportunities, the bargaining position of regular labourers in Aurepalle is weaker compared to other study villages, giving rise to a lower market wage in Aurepalle.

4.5.3. Comparison with Existing Studies

A comparison of casual and regular wages in the study villages shows that casual

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[13]It should be remembered here that the period of contract varies among the study villages. Hence, the total income from the regular contract is the daily regular wage multiplied by the average period of contract in each village; the average periods of contract are approximately 300 days, 250 days and 100 days in Aurepalle, Shirapur and Kanzara respectively.

[14]Often the non-farm job prospects come from the neighbourhood of the village; hence, labourers may have to travel a few miles to go to the work place.

[15]This observation is also supported by Walker & Ryan (1990), pp. 133.

[16]Further see our discussion in chapter seven.

daily earnings are higher for casual than that for regular labour, though regular annual earnings may be higher than casual annual earnings from farm work only. A number of studies, drawn from different parts of India, also report similar results.

For example, using data from the Second Agricultural Labour Enquiry (1960), the Rural Labour Enquiry (1963), Final Report and the National Sample Survey (25th round), Ghose (1980) has compared the daily and annual casual (male) and regular wages (1960-61=100) in different states of India. His estimates are given in table 5.3. The table shows that annual regular wages are higher in most states of India like Assam, Bihar, Karnataka, Rajasthan, U.P. (Uttar Pradesh) and West Bengal. However, daily casual wages are found to be higher than daily regular wages in all the states, except Bihar. Using the same data-set, Basant (1984) finds slightly different results from those obtained by Ghose (1980). He finds that daily regular wages are higher than daily casual wages in Bihar and Mysore, equal in West Bengal, while lower in Andhra Pradesh, Assam, Kerala, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh and Bombay.

Next we refer to Rudra (1982a). Using the findings of the Farm Management Survey, Rudra compares casual and regular daily wages. His findings are summarised in table 5.3'. Rudra, too, finds that in all cases, casual daily wages are higher than regular daily wages. In an earlier study, using Intensive Survey of Agricultural Labour (Vol. I - All India), Sanghvi (1969) also finds that the regular daily wage is less than casual daily wage in most states in India. Table 5.3" is taken from Sanghvi (Table 4.7, pp.100).

In general, most studies indicate that casual daily wages are higher than regular daily wages which lends support to hypothesis H1. However, annual wages are not readily comparable in the study villages because of the variation in the duration of the contract. In other studies, no such conclusive trends are found; sometimes annual wages from casual labour are higher than annual wages from regular labour, sometimes it is the other way round. Secondly, the composition of total income between farm and non-farm income is not clear in some of the available studies. We, however, distinguish between farm and non-farm income earned by a casual labourer. This is important in the comparison between casual and regular contracts because regular labourers do not have the opportunity to participate in non-farm employment. Finally, as already mentioned, landed casual labourers earn some income from own farms. Hence, a distinction needs to be made between landed and landless casual labourers, though none of the studies referred to here do so. To the extent that own farm income is significant in total casual income, it may offer a kind of employment insurance to these landed labourers. Regular daily earnings are lower than casual daily earnings; this is true even if we take unemployment into account. In this context, the role of employment insurance cannot be undermined. Therefore, the consideration of employment insurance may affect the choice between casual and regular contracts.

In an implicit contract framework, where risk-neutral farms enter a contract with risk-averse labourers, regular daily wages are less than casual daily wages. As shown in the extension of the implicit contract model in chapter two, the difference between the two constitutes the premium for employment insurance. Rudra (1982a) has also argued that in the rural labour market with fluctuations of employment over slack and peak periods, the difference in casual and regular daily wages accounts for the premium for employment insurance in regular farm contracts.

4.6. Aspects of Rural Credit

Offering additional non-wage facilities to regular farm servants is common in rural India, the most common form being the credit-labour interlinkage in the regular contracts. Breman (1974) finds that the availability of consumption credit is common in the backward parts of Gujrat and Maharashtra; Bardhan and Rudra (1981) find that regular farm labourers in eastern India obtain small consumption loans from the employer. Bell and Srinivasan (1988) report that regular farm servants in the villages of Bihar, Punjab and Andhra Pradesh are entitled to obtain interest-free wage advances from the regular employer.

Besides credit, attached labourers may also get some land from the employer. Bardhan and Rudra (1981) report that in the Gangetic plains, the incidence of land allotment is as high as 89% in Uttar Pradesh whereas it is almost negligible in West Bengal. Sundari (1981) finds that the practice of land allotment to tied labourers is common in Chingleput district of Tamil Nadu whereas Gough (1983) finds the practice obsolete in Thanjavur district. Breman (1974), Reddy (1985), and Walker and Ryan (1990), too, do not find the practice of land allotment in Gujrat, Maharashtra and the ICRISAT villages, respectively. The reasons why regular labourers are allotted land in some regions, but not in others call for further investigation, but this issue will not be pursued here. One possible reason may be as follows. If regular labourers are employed mostly on large farms where average value of land is the highest, the opportunity cost of ceding this land to workers will be high. Therefore, land is not ceded.

Regular farm servants in all the study villages are found to obtain some interest-free wage advance (i.e., credit) from the regular employer which a casual labourer does not get. This section examines how the offer of credit in the regular contract may modify the labourers' (especially the landless labourers') preference between casual and regular contracts.

4.6.1. Nature of the Credit Market

Given the seasonality of production and frequent crop failure in the semi-arid tropics of India, access to credit is crucial to smooth out production and consumption at the household level.

Credit markets in the study villages are segmented between formal and informal sectors. Given the difference between these two sectors in the prevailing rates of interest as well as the collateral requirement, rural households are divided between them according to their landholding status because land is the most acceptable form of collateral. Usually, formal credit requires a substantial amount of collateral while the collateral requirement is negligible in the informal credit market; however, the rates of interest charged by the informal credit sources are much higher. The formal credit market consists of the cooperative credit societies[17], the commercial banks (interest charged is between 9% and 14% per year), land development banks and other government agencies. The other component is the unorganized or informal market which includes the credit offered by the moneylender (annual interest charged ranges from 18% to 36% in Aurepalle, a maximum of 16% in Shirapur or Kanzara[18]), relatives, friends and the employees of the regular farm servants (annual interest charged varies between 18% and 24%). In what follows, it is clear that formal credit is cheaper than informal credit in the study villages.

Table 6.1 which is borrowed from Bhende (1986) describes the sources and volume of credit available to the sample households. The incidence of formal credit (from co-operative credit societies, land development banks, commercial banks etc.) is relatively low in Aurepalle where informal sources (e.g., private moneylenders) supply the bulk of the credit. In Shirapur and Kanzara, however, the bulk of credit comes from the formal sources.

Table 6.1' compares the share of formal credit among farms of different sizes. The smaller landholding classes in Shirapur and Kanzara have greater access to the formal sector compared to those in Aurepalle. However, neither in Kanzara nor Aurepalle, do the labouring households have any access to formal credit; the situation is different in Shirapur, where 75% of the labour households have access to the cheaper formal credit. This has been made

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[17]In Akola villages, the major share of 46%-48% of total credit is advanced by the cooperative credit sector.

[18]This has been made possible by the passing of the Moneylenders' Act of 1960 by the Maharashtra Government which specifies registration and the maximum interest rate of 16% per annum.

possible by the Drought Prone Area Program (DPAP) which is operating in Shirapur and not in the other two study villages. On the whole, it appears that the spread of formal credit is much less among the different landholding classes in Aurepalle; in contrast, the access to formal credit is higher in Shirapur and Kanzara. In other words, the credit constraint on the labour households, especially the poorer landless ones, is more binding in Aurepalle compared to the other two study villages.

Though the rate of interest charged by the informal source of credit is usually higher, villagers, especially the landless households, often prefer to go to the latter because no collateral is required while normally land is regarded as the most acceptable form of collateral in the formal credit market. Moreover, loans can be obtained relatively quickly; in contrast, obtaining credit from the financial institutions (banks or cooperatives) requires a lot more formalities to be completed and may even require bribes to be paid to the concerned official.

This information lends support to the primary assumption of the Collateral model that the marginal cost of credit (discount factor ρ_t) is higher for employees than (ρ'_t) for employers (see chapter two). In other words, market interest rates facing poorer, landless labourers are higher than for wealthier employers in the study villages.

4.6.2. Incidence of Wage Advance

Landless labourers are unable to offer collateral as required in a formal credit market; hence, they are forced to go to the informal credit market. Even in the informal credit market, the availability of credit depends on the wealth and reputation of the borrower. In Kanzara, landless labourers can borrow Rs. 100 from the moneylender without collateral and a maximum of Rs. 500 by offering collateral in the form of livestock, durable goods etc. As already mentioned, Shirapur comes under the Drought Prone Area Program (DPAP) where credit is made available to landless labourers and small farmers to buy sheep, goats and cattle from the Cooperative Society. However, landless labourers find it difficult to secure credit for consumption purposes.

It is customary for regular farm servants in the study villages to receive an advance payment from the employers. The contract with the employer acts as the substitute for a collateral, which is otherwise difficult to provide. This appears to be the principal motivation to enter a regular contract, as revealed again and again in our interviews conducted in Aurepalle in 1991 and 1992 (also, see Binswanger et al., 1984; Walker, 1990).

Consequently, individuals from households with no/marginal landholdings may prefer to participate in regular farm jobs. Regular wages are usually paid in a few instalments, a major portion of which is paid at the beginning of the contract period (Walker & Ryan, 1990). This is called an advance, on which no interest is charged. But if the amount of the advance exceeds the total sum to be received from the contract, an interest is charged. In Aurepalle, the interest charged is usually 18%. In Kanzara, interest may take the form of a reduction in the salary given while in Shirapur apparently no interest is charged. In many cases, the understanding about the interest charged is implicit rather than explicit; hence, the information is difficult to obtain.

Let us explain how the credit-labour linkage in the regular farm contracts works in Aurepalle. The analysis is based on my resurvey data collected from Aurepalle in January, 1992 (see chapter three) as shown in table 6.2.

The following inferences can be made from the available information. A significant proportion of regular wages are taken as an advance (interest-free) in the beginning of the contract period; all the regular farm servants in our sample have taken advances from the employer. An advance is treated as a loan when the amount of the advance is greater than the amount of the wage contract for the period. This is found to occur in 50% of the cases and interest at the rate of 18% is charged on the loan component. In 50% of the cases in which a loan is incurred, it is found to be taken for productive purposes like purchasing land/bullocks or for cultivation of the family land. Sometimes, it is taken for consumption purposes, like construction of residential houses, a marriage in the family, medical treatment of a family member or repayment of old debts.

The results obtained from sections 4.6.1 and 4.6.2 lend support to hypothesis H5. The credit market is segmented between the formal and informal sectors and the labourers have access to a different segment (informal credit) as opposed to the employers such that employers face a lower interest rate (i.e., discount rate). Consequently, the lower discount rates of employers vis-a-vis labourers provides the principal motivation for the payment of advances to regular labourers.

4.6.3. Implicit Vs. Market Rates of Interest

Given the segmentation of the rural credit markets between formal and informal sectors, the computation of interest rates implicit in regular farm contracts is an exercise of great interest. We determine implicit rates of interest as follows.

To simplify the exercise, we consider *landless labourers* only. Suppose both casual and regular labourers are available for works for L days a year. If $r = r^*$ is the rate of interest at which a labourer is indifferent between accepting a regular contract at the beginning of the year, or remaining in the casual labour market, the following expression holds good :

$$\begin{aligned} (1 + r^*)\, w_d^P\, L &= w_d^C\, (1 - u)\, L \\ \Rightarrow r^* &= \frac{w_d^C\,(1 - u)}{w_d^P} - 1 \end{aligned} \qquad (2)$$

where w^P_d, w^C_d are regular and casual daily wages respectively and u is the probability of unemployment[19].

Given daily regular and casual (adjusted) wages in table 5.2 of the chapter, values of implicit interest rates can be calculated from equation (2). Estimated values of the implicit interest rate are shown in table 6.3. Implicit interest rates vary among the study villages; Kanzara has the lowest annual rate of interest while Aurepalle the highest.

Next, values of the implicit interest rates are compared with the observed market rates of interest prevailing in the study villages (see table 6.3'). While (a), (b) and (c) comprise the sources of formal credit, (d) alone is the main source of informal credit in the study villages. As already mentioned (tables 6.1 and 6.1'), the formal and informal credit agencies in the study villages charge different rates of interest which vary with the size and the period for which the loan is incurred.

While comparing implicit interest rates with observed market interest rates, attention is paid to the reference period. If the regular contract lasts for one year as in Aurepalle, the reference period is one year. Casual wages are distributed over this reference period while regular wages are paid at the end of the reference period. Assuming that all casual wages are paid in the middle of the reference period, r^* is compared with an observed interest rate applying to a six-month loan[20].

If the implicit interest rate (r^*) is higher than the prevailing market rate of interest, a landless labourer who is not rationed on the credit market (formal or informal), ought to

[19]Equation (2) assumes that both casual and regular labourers work equal number of days in a year. Also, as already mentioned in chapter two (foot note 8) that due to the indivisibility of annual regular contracts it is an artificial normalization to use daily wages.

[20]Theoretically, if wages are paid on a daily basis, one can compare $1/(1+r^*)$ with $\Sigma_t 1/(1+r^m)^t$ where $r=r^m$ is the market interest rate observed per day so that t ranges between 1 and 365 days.

prefer casual contracts to regular contracts. When we compare the implicit interest rate with the observed interest rate, the situation varies among the study villages.

Minimum, maximum and modal values of the relevant interest rates are shown for each village. In order to get an idea of the credit constraint, let us compare the implicit interest rates with the observed modal interest rates. Among the study villages, the implicit interest rate is the lowest in Kanzara. The modal interest rates charged by different formal and informal sources are higher than the implicit interest rate. Hence, a landless labourer in Kanzara may optimally choose a regular contract. The implicit interest rate is 130% in Shirapur which is higher than the observed modal interest rates from formal and informal sources in the village. Hence, a landless labourer in Shirapur ought to prefer a casual contract if s/he has access to formal/informal credit. The implicit interest rate is the highest (258%) in Aurepalle which is higher than the modal interest rates charged by the government, commercial banks, co-operatives as well as private moneylenders. This implies that a landless labourer in Aurepalle is better off choosing a casual contract unless he is rationed on the formal and/or informal credit markets. Thus, in Aurepalle and Shirapur, quantity rationing on the credit market seems to be necessary to explain why some landless labourers choose regular contracts.

However, as already discussed in section 4.6.1, cheaper credit is available sometimes even to the landless households in Shirapur under various government programmes (also see chapter seven). This may explain why the credit incentive of regular contracts may be relatively less in Shirapur relative to that in Aurepalle and Kanzara. Consequently, the incidence of regular contracts is less in Shirapur (see table 3.1).

Conclusion

This chapter offers some preliminary empirical evidence on the factors which determine the choice between casual and regular contracts in rural India. With this aim in view, it analyses some aspects of labour and credit markets in the study villages with reference to these in an all-India context.

Sections 4.1 and 4.2 offer useful background information as to the structure and functioning of rural labour markets in the study villages, with reference to the rest of India. Labour markets in the study villages are divided between casual and regular jobs and between farm and non-farm jobs. Primarily males dominate in the regular labour market while the casual labour market is divided between male and female labourers. Unemployment is pervasive in the casual labour market, especially during the slack periods in agriculture and among female labourers. While section 4.3 considers the pattern of labour demand section 4.4 studies that of labour supply. The analysis clearly shows the seasonal character of rural labour markets in India, reflected not only in the variation of wages over the production cycle, but also in the fluctuations of participation and unemployment rates.

Section 4.5 looks at the issue of comparative wages and, among other things, shows that risk-neutral landless labourers ought to prefer casual to regular contracts because casual daily wages are higher even if we take unemployment into account. Section 4.6, however, shows that this argument gets strongly modified once we take into account the fact that regular labourers receive a large part of their wages in advance and that the comparative attractiveness of casual and regular contracts depends quite crucially on whether and at what rates labourers have access to credit.

CHAPTER 4 : TABLES

TABLE 1.1. Composition (%) of Main and Marginal Workers in Rural India

Employment Status	1977-78	
	Male	Female
Self-Employment	62.8%	62.1%
Regular Wage/Salaried Employment	10.6%	2.8%
Casual Wage Employment	26.7%	35.1%

Source : A. Vaidyanathan (1986).

TABLE 1.1'. Pattern of Labour Use (10^9 Days/Year) in Indian Agriculture, 1977-78

Type of Labour	Family	Regular	Casual	Total
Male	25.2	2.4	7.8	35.4
Female	9.3	0.3	4.8	14.4
Total	34.5 (69.3)%	2.7 (5.4)%	12.6 (25.3%)	49.8 (100.00%)

Source : A. Vaidyanathan (1986).

TABLE 1.2. Types of Casual Contracts (% of Respondents)

Type	West Bengal	Bihar	Orissa	U.P
Daily Contracts	75	95	100	92
Contracts for Longer Periods	24	3.7	0.0	8.1
Piece-Rate Contracts	16	21	0.0	0.0

Source : A. Rudra, 1982.

Note: The same village may have more than one type of contract; hence, the entries (which are % of villages) need not add up to 100.

TABLE 1.2'. Seasonal Fluctuations in Casual Employment in India

Quarter	Male Employment (Days/Week)		Female Employment (Days/Week)		Casual Farm Wage (Rs./Day)	
	Farm	All	Farm	All	Male	Female
Oct.-Dec.	5.28	6.08	3.93	4.49	2.76	2.29
Jan.-Mar.	4.12	5.15	2.21	3.23	2.46	2.09
Apr.-June	4.44	5.15	1.91	3.05	2.56	1.76
July-Sep.	4.90	5.67	4.24	4.86	3.11	2.64
Overall	4.69	5.52	3.15	3.97	2.75	2.33

Source : NSS, 27th round.

TABLE 1.2". Distribution (%) of Employment in Agriculture by Operations and Sex, 1977-78

Operations	Male	Female	Total
Ploughing	14.0	1.5	10.3
Sowing	2.0	1.6	1.9
Transplanting	2.7	5.8	3.6
Weeding	7.2	14.7	9.7
Harvesting	12.7	19.5	14.7
Manual Work	55.9	53.8	55.0
Non-Manual Work	5.5	3.1	4.8

Source : Vaidyanathan (1986).

TABLE 1.2'''. Duration of Farm Servants' Contracts

Duration of the Contract	Number of Cases
1 Season	4
1 Year	57
2 Years	3
3 Years and Above	5
Total Number of Cases Observed	69

Source : Rudra (1982).

TABLE 1.2"". Rural-To-Rural Migration in India, 1981

Last Residence Rural	Short-Duration Migration as % of Total Migration	
	Male	Female
Within the District	8.32	13.08
In Other District of the State	13.29	25.98
Other States	16.32	27.90

Source : S. Mukhopadhyay (1987).

TABLE 2.1. Distribution of Male and Female Casual Employment in the Study Villages, 1980-84

Employment	Aurepalle		Shirapur		Kanzara	
	Male	Female	Male	Female	Male	Female
Self	0.35	0.47	0.51	0.26	0.67	0.35
Casual	0.07	0.40	0.32	0.24	0.19	0.21
Regular	0.41	0.05	0.007	0.20	0.01	0.28
Others	0.17	0.08	0.165	0.29	0.12	0.16

TABLE 3.1. Proportion of Family-Labour and Regular-Labour Hours Used in Sample Farms in the Study Villages

Village	PL/TL in Farms Hiring Regular Labour			FL/TL in Farms Hiring Regular Labour		
	Small	Large	All	Small	Large	All
A	0.22 (0.03)	0.25 (0.13)	0.25 (0.08)	0.55 (0.67)	0.24 (0.44)	0.29 (0.55)
C	0.27 (0.01)	0.35 (0.02)	0.32 (0.01)	0.21 (0.60)	0.36 (0.55)	0.27 (0.58)
E	na (na)	0.16 (0.04)	0.16 (0.03)	na (0.58)	0.18 (0.39)	0.18 (0.46)

Note: A ⇒ Aurepalle; C ⇒ Shirapur ; E ⇒ Kanzara; PL ⇒ Regular Labour-Hours, FL ⇒ Family Labour-Hours, TL ⇒ Total Labour-Hours. Numbers in the parentheses denote the average use of respective types of labour if all farms are considered. 'na' implies not available.

TABLE 4.1. Probability of Participation in Farm Labour and Casual Farm Labour in the Study Villages, 1980-84

	Participation Probability	Aurepalle		Shirapur		Kanzara	
		Landless	Landed	Landless	Landed	Landless	Landed
Male	POL	0.62	0.78	0.43	0.56	0.69	0.76
	POM	0.62	0.57	0.43	0.24	0.69	0.43
Female	POL	0.74	0.81	0.58	0.58	0.69	0.84
	POM	0.74	0.70	0.58	0.44	0.69	0.60

Note : Probabilities of participation (POL and POM) are defined in the text. POM does not include the days worked on own farm.

TABLE 4.2. Probability of Involuntary Unemployment (PU) in the Study Villages, 1980-84

Year	Aurepalle		Shirapur		Kanzara	
	Male	Female	Male	Female	Male	Female
1980	0.22	0.24	0.38	0.39	0.29	0.26
1981	0.13	0.17	0.47	0.37	0.14	0.16
1982	0.11	0.22	0.43	0.36	0.08	0.07
1983	0.12	0.19	0.10	0.11	0.05	0.07
1984	0.10	0.15	0.02	0.03	0.10	0.09
1980-84	0.14	0.20	0.31	0.26	0.13	0.13
Landed	0.13	0.19	0.34	0.25	0.13	0.13
Landless	0.20	0.25	0.21	0.28	0.14	0.14

Note : Probability of unemployment is defined in the text.

TABLE 4.3. Monthly Duration (Days) of Unemployment in the Study Villages, 1980

Months	Aurepalle		Shirapur		Kanzara	
	Male	Female	Male	Female	Male	Female
January	2.71	5.50	0.80	6.67	6.33	7.13
February	5.14	5.71	1.22	3.67	5.00	5.46
March	5.43	11.69	7.75	13.83	7.53	12.24
April	4.38	10.29	7.43	10.00	5.06	7.87
May	4.14	4.72	3.71	16.00	5.80	10.23
June	6.00	5.85	8.27	17.50	3.36	4.52
July	6.67	4.48	0.78	1.33	5.77	6.14
August	2.83	2.33	12.67	18.70	11.29	11.85
September	3.45	2.62	15.20	8.50	5.24	4.13
October	2.50	3.09	9.50	9.43	0.93	4.21
November	4.64	4.41	5.75	3.92	4.63	2.50
December	3.30	3.76	5.33	7.67	4.44	5.22

TABLE 5.1. Employment Particulars of Casual Labourers in the Study Villages, 1980-84

Village	Male Casual Labourers			
	FDAY (Days)	NFDAY (Days)	GDAY (Days)	TOTEMP (Days)
Aurepalle	59.25	17.84	0.62	77.70
Shirapur	50.98	24.55	21.26	96.80
Kanzara	71.00	9.47	21.23	101.70

TABLE 5.2. A Comparison of Casual and Regular Wages (Rs.) At 1960-61 Prices in the Study Villages, 1980-84

Villages	Regular Labourers		Male Casual Labourers				
			TFWAGE	DCLWAGE	DCLWAGE'		
	TOTWAGE	DPLWAGE			Landed	Landless	All
A	112.74	0.38	71.40	1.46	1.17	1.36	1.21
C	157.77	0.63	97.96	2.14	1.14	1.45	1.36
E	131.61	1.32	104.78	1.47	1.17	1.33	1.29

Note : A ⇒ Aurepalle; C ⇒ Shirapur; E ⇒ Kanzara.

TOTWAGE and TOTFWAGE are the annual wage incomes earned by regular and casual labourers from farm employment earned by regular and casual labourers respectively; DPLWAGE and DCWAÇE are the average regular and casual daily wages while DCWAGE' is the average casual daily wage adjusted by the probability of employment.

TABLE 5.2'. Significance of Non-Farm Casual Income in the Study Villages, 1980-84

Village	TNFWAGE/TOTWAGE			TOTCWAGE
	Landless	Landed	All	
Aurepalle	0.22	0.15	0.17	157.86
Shirapur	0.44	0.40	0.41	181.06
Kanzara	0.28	0.19	0.22	182.88

Note : TOTNFWAGE is the average annual non-farm income while TOTCWAGE is the total casual wage income in Rs. at 1960-61 prices earned from casual employment.

TABLE 5.3. Casual and Regular (Daily and Annual) Wages (Rs.) in Different States of India, 1956-57

State	Annual Wage Income (Rs.)			Daily Wage Income (Rs.)	
	Casual	Regular	All	Casual	Regular
A.P.	398	387	395	0.81	0.46
Assam	578	625	614	1.25	1.11
Bihar	377	461	414	0.89	1.02
Gujrat	*	*	*	*	*
Maharashtra	*	*	*	*	*
Kerala	388	469	399	1.17	0.75
Karnataka	531	518	529	0.91	0.81
M.P.	321	387	341	0.78	0.55
Orissa	342	377	347	0.87	0.61
Punjab	606	764	683	1.85	1.29
Haryana	*	*	*	*	*
Rajasthan	349	290	336	0.98	0.45
Tamilnadu	347	293	338	0.76	0.46
U.P.	407	487	420	1.08	0.70
West Bengal	482	626	514	1.12	0.99

Source : Ghose (1980).

TABLE 5.3'. Casual and Regular Daily Wages (Rs.) in Different States of India in the Sixties

State	Year	Casual Daily Wages	Regular Daily Wages
Assam (Nowgong)	1968-71	3.81	3.17
Punjab (Ferozpur)	1967-70	5.04	4.57
A.P. (Cuddapah)	1967-70	2.02	1.11
Orissa (Cuttack)	1967-70	2.58	0.96
Kerala (Alleppy and Quilon)	1962-65	2.43	1.77
U.P. (Mujaffarnagar)	1966-69	2.83	2.71

Source : Rudra (1982).

TABLE 5.3". Casual and Regular Wages (in Annas) in Different States of India

State	Regular Labourer		Male Casual Labourers	
	Daily Wage	Annual Wage	Daily Wage	Annual Wage
Uttar Pradesh	15	5175	19	5264
Bombay	11	3638	18	2957
West Bengal	24	7426	27	6426
Punjab	19	4800	29	3175
South India	13	2362	16	2802
Orissa	08	6762	12	2725
Madhya Pradesh	12	4407	13	2379
India	12	4047	18	3500

Source : Sanghvi (1969).
Note : In common usage sixteen anna is equal to one Indian Rupee.

TABLE 6.1. Sources and Volumes (% Share in Total) of Credit in the Study Villages, 1975-84

Sources	% Share in Total		
	Aurepalle	Shirapur	Kanzara
Co-operative Society	1	47	46
Land Development Banks	38	9	34
Commercial Banks	2	8	11
Government Agencies	3	2	2
Friends and Relatives	1	19	3
Private MoneyLenders	52	15	4

Source : Bhende (1986).

TABLE 6.1'. Access to Formal and Informal Credit by Different Landholding Classes in the Study Villages, 1975-84.

Landholding Class	Households Having Access to Informal Credit (%)	Households Having Access to Formal Credit (%)	Share of Formal Credit in Total Credit (%)
Aurepalle:			
Labour	100	0	0
Small Farms	93	7	52
Medium Farms	100	11	15
Large Farms	91	36	59
Total	95	15	47
Shirapur			
Labour	100	75	75
Small Farms	87	50	38
Medium Farms	92	69	68
Large Farms	100	82	73
Total	95	70	66
Kanzara			
Labour	12	0	0
Small Farms	80	73	95
Medium Farms	100	100	82
Large Farms	87	87	97
Total	72	67	94

Source : Bhende, 1986.

TABLE 6.2. Incidence of Advance/Loan in Regular Contracts in Aurepalle, 1992.

Variable	TOTWAGE			Loan		
	≤ 300	300-500	> 500	≤ 300	300-500	> 500
Frequency	38.46%	57.69%	4.46%	30.7%	15.4%	38.5%

Source : Resurvey Data, 1992.
Note : Annual regular wage TOTWAGE is calculated at 1960-61 prices.

TABLE 6.3. Implicit Interest Rates in Regular Contracts in the Study Villages, 1980-84

Villages	Implicit Annual Interest Rate (%)
Aurepalle	258
Shirapur	130
Kanzara	0.8

Note : Implicit interest rate is the interest rate at which a landless labourer is indifferent between a casual and a regular contract.

TABLE 6.3'. Observed Annual Interest Rates in the Study Villages, 1980-84

Sources	Aurepalle	Shirapur	Kanzara
(a) Government	12% (12%)	12%-156% (36%)	10%-376% (10%)
(b) Commercial Banks	-	6%-92% (12%)	6%-12% (12%)
(c) Co-operatives	12%-72% (72%)[2]	12% (12%)	6%-12% (6%)
(d) Private Moneylenders	12%-168% (12%)	12%-132% (12%)	6%-12% (12%)
Others [1]	12%-600% (216%)	12%-120% (36%)	10%-144% (48%)

Note :[1] 'Others' refer to private shops, friends, relatives, landlords etc.
[2] Numbers in the parentheses refer to the modal interest rates charged by the respective credit agencies.

CHAPTER 5. CASUAL AND REGULAR CONTRACTS : DETERMINANTS OF THE FARMS' CHOICE OF LABOUR CONTRACTS

Introduction

It has been argued in chapter two that, given the hoarding costs associated with hiring regular labour, it is larger farms (with relatively high and steady labour requirements) that are more likely to hire regular farm servants. We have also argued that regular labour is hired to perform certain non-monitorable tasks, which are difficult to supervise. This leads us to investigate empirically the relevance of two possible determinants of the demand for regular labour: farm size and nature of task. Using the ICRISAT data available from the study villages, this chapter examines the validity of the following hypotheses (see also the introductory chapter):

H2. Larger farms tend to employ more regular farm servants than smaller farms.

H4. Farms tend to employ regular farm servants in the non-monitorable tasks.

The chapter is developed as follows. In section 5.1, a description of the regression variables used in the analysis is given. The hypotheses are then examined in sections 5.2, 5.3 and 5.4 of the chapter. The chapter ends with a brief summary of the findings.

5.1. Description of Regression Variables

The empirical exercise to test the hypotheses focuses on three villages from the semi-arid tropics of India, namely, Aurepalle, Shirapur and Kanzara (see chapter three). The analysis is based on observations for a period of five years (1980 to 1984). The following variables have been constructed for each village and for each agricultural year of the study period 1980-84.

Information about the landholding class (LHCLASS) is given in all the schedules. Using LHCLASS, the type of the farm is constructed as follows :

TYPE = 1, if the i-th farm is a larger one
= 0 otherwise.

Next, the contract variable is constructed as follows. First, from the VLS-Y schedule, we construct the variable SPLHR giving the total number of regular labour-hours used on different plots owned by the household. Using SPLHR, we construct the contract variable PL as follows:

PL = 1 if the i-th farm hires some regular labour (SPLHR > 0);
= 0 otherwise.

Task dummy used in the analysis is defined as follows :

TASK = 1 if the i-th labour is hired to perform non-monitorable tasks
= 0 otherwise

Other variables used in the analysis are as follows[1] :

FEQVALD = Total value of farm-equipments held.
LNFEQVAL = Natural logarithm of FEQVALD
MPLOTVAL = Mean value of the plots per acre belonging to each household at 1960-61 prices
LNPLOTVA = Natural logarithm of LNPLOTVA
AGGCULT = Aggregate area cultivated
LNCULT = Natural logarithm of AGGCULT
AGGIRR = Aggregate area irrigated
LNIRR = Natural logarithm of AGGIRR
SFLHR = Total number of family labour-hours used in cultivation
LNSFLHR = Natural logarithm of SFLHR
OBUL - A dummy variable which takes a value 1 if the farm in question uses its own livestock in cultivation, and zero otherwise.

The following village and year dummies are also constructed.

AUREPALLE - It takes a value one if the observed farm comes from Aurepalle; it is zero otherwise;
KANZARA - It takes a value 1 if the observed farm comes from Kanzara; it is zero otherwise;
YEAR80 - It is equal to one, if the observation is from year 1980, and zero otherwise
YEAR81 - It is equal to one, if the observation is from year 1981, and zero otherwise
YEAR82 - It is equal to one, if the observation is from year 1982, and zero otherwise
YEAR83 - It is equal to one, if the observation is from year 1983, and zero otherwise.

5.2. Determinants of Choice of Contract and Demand for Regular Labour-Hours

This section examines hypothesis H2 which emphasizes the role of farm size in determining the farm's demand for regular labour. It was argued in section 2.2 of chapter two that the larger the farm size, the larger is the demand for regular labour because the hoarding

[1]For details of the construction of these variables, see chapter three.

costs of maintaining a steady pool of regular labour are lower.

To begin with, the conditional probability that a farm of given size hires regular labour-hours is calculated as follows. Suppose A_i denotes the event that a farm is of size i, i=s,l where 's' refers to the small farms and 'l' to the larger farms[2]. Let B denote the event that the farm of a given size hires some regular farm servants. Since the probability of the event B given A_i can be approximated by the relative frequency, the conditional probability of B given A_i is given by the following expression.

$$Pr(B/A_i) = \frac{n(A_i\, B)}{n(A_i)} \tag{1}$$

where $n(A_iB)$ is the number of joint occurrences of A_i and B and $n(A_i)$ is the number of occurrences of A_i in the total number of occurrences of these two events. Values of these conditional probabilities for each type of farm are given in table 2 for each of the study villages.

In both Aurepalle and Kanzara, the probability of employing regular labour is higher on the larger farms as compared to the smaller ones. In fact, in Kanzara the probability is zero for the smaller farms. In Shirapur the probability of hiring a regular labour is, however, very low in either type of farm, though still higher for the larger farms. When all the study villages are pooled together, the conditional probability of employing a regular labourer is found to be much higher on the larger farms.

Using chi-square tests of independence, a simple statistic between type of farm (TYPE) and that of contract (PL) can be constructed (see Appendix 1). Computed values of chi-square test statistics (Pearson as well as likelihood ratio LR) are given in table 2'. Chi-square statistics are significant and suggest that there is a statistically significant relationship between farm size and type of contract in Aurepalle and Kanzara; however, the chi-square test statistics are not significant in Shirapur. When all the study villages are taken together, the significant relationship between the variables is still maintained.

Next, we draw a few diagrams to explore the relationship between SPLHR, SCLHR, on the one hand, and landholding status (TYPE) or farm size (AGGCULT), on the other. Figures 1-3 are a series of scatter diagrams for the study villages where we plot total casual

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[2]Using the variable TYPE, sample farms are classified into two groups, namely, 'small' (TYPE=0) and 'large' (TYPE=1).

labour-hours (SCLHR) on the horizontal axis and total regular labour-hours (SPLHR) on the vertical axis according to whether the farm in question is a small (TYPE = 0) or large (TYPE = 1) farm. The empty squares show the use of labour-hours by the larger farms while asterisks show the same for the smaller farms. It can clearly be seen from figures 1 and 3 that a significant number of large farms in Aurepalle and Kanzara rely on regular labour (a large number of empty squares lie in the positive quadrant) while a large number of asterisk signs lie on the horizontal axis, thereby implying that these small farms do not hire regular labour at all. Interestingly enough, none of the small farms in Kanzara hire regular labourers while there are only a few small farms in Aurepalle who hire some regular labour. The situation is very different in Shirapur where only a few farms (both small and large) hire regular labourers. On the whole, it appears that, regular labourers tend to be hired by the large farms in the study villages.

The pattern of labour hiring becomes clearer when we consider the continuous farm size variable AGGCULT. Figures 4-6 depict total regular-labour (SPLHR denoted by the solid line) and casual-labour (SCLHR denoted by the dotted line) hours plotted against farm size (AGGCULT) in each of the study villages. The demand for casual labour fluctuates among the farms of different size. However, it is clearly seen that the larger the farm size, the greater is the demand for regular labour-hours in all the study villages.

The discussion so far suggests that there is a strong correlation between the size of farm and the type of contract offered. In the light of this relationship, a regression framework is built up to determine the factors (including farm size) that significantly explain the demand for regular labour in the study villages. This can be looked at in two ways: (i) how farms choose between casual and regular contracts (PL) and (ii) how farms determine the demand for regular labour-hours (SPLHR). The distinction between (i) and (ii) is that the dummy dependent variable PL in (i) is replaced by a continuous variable SPLHR in (ii). In this section, these two decision variables, namely, the type of the contract and the demand for regular labour-hours, are determined independently in a univariate framework[3].

The analysis is primarily based on the estimates of univariate probit and tobit models. A univariate probit model is one where the dependent variable of the regression is a dummy variable (it takes a value 0 or 1). In a tobit model, however, the dependent variable is continuous, but censored; tobit random term follows a normal distribution as in a probit model.

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[3]The case of joint determination of the type of the contract and the demand for regular labour-hours is taken up in section 5.3.

The section is developed as follows. Section 5.2.1 describes the method of estimation (probit and tobit models) while section 5.2.2 presents the probit and tobit estimates of the determinants of the type of contract. Finally, in section 5.2.3 the significance of hoarding costs are examined by considering only those farms which hire regular labour, making use of a truncated regression model.

5.2.1. Probit and Tobit Models

Firstly, we estimate a univariate probit model of the determinants of the type of the contract PL; a number of explanatory variables are included of which one is farm size. Secondly, a tobit model is used where the dependent variable of regression is LNSPLHR (natural logarithm of SPLHR) with the set of explanatory variables remaining the same. In each case, the marginal effects of the explanatory variables have been calculated.

5.2.1.1. Probit Model

Suppose that the dependent variable of interest is a dummy variable denoting the type of the contract (PL) which takes a value 1 if the farm offers a regular contract and is zero otherwise. The aim is to find out the factors that determine PL. Assuming that a set of explanatory variables x determines the choice of the optimum contract, the following relation holds good.

$$\begin{aligned} Prob[PL = 1] &= F(x\ ,\ \beta) \\ Prob[PL = 0] &= 1 - F(x\ ,\ \beta) \end{aligned} \tag{2}$$

where F is the cumulative distribution function. The parameter vector β reflects the impact of changes in X on the probability. In this regard, one can use any continuous distribution; in practice, however, the use of a probit model which uses a normal distribution is common (Maddala, 1983; Greene, 1992).

$$Prob[PL = 1] = \int_{-\infty}^{\beta' x} \phi(t)dt = \Phi(\beta' x) \tag{3}$$

where Φ is the cumulative normal distribution function. The probability model, in general, involves a regression framework such that the following holds good :

$$E(y) = 0 * [1 - F(\beta'x)] + 1 * F(\beta'x) = F(\beta'x) \tag{4}$$

where y is the dependent variable of regression - this is PL in our context.

In each case, the parameter vector β can be estimated by maximising the log-likelihood function L.

$$L = \sum_i \left[y_i \ln\Phi(\beta'x_i) + (1 - y_i)\ln(1 - \Phi(\beta'x_i)) \right] \tag{5}$$

If, however, heteroscedasticity is present, the original probit estimates are to be corrected. Suppose the variance of the random term σ^2_i follows a multiplicative heteroscedastic model (see Petersen and Waldman, 1981):

$$\sigma_i^2 = \exp(\gamma' Z_i) \tag{6}$$

where Z_i is the vector of explanatory variables causing heteroscedasticity (a subset of x).

The final task is to incorporate σ_i^2 into the log-likelihood function to estimate (β, γ) as follows:

$$\ln L' = \sum_i \left[y_i \ln\Phi\frac{\beta' x_i}{\exp(\gamma' z_i)} + (1 - y_i) \ln\left(1 - \Phi\frac{\beta' x_i}{\exp(\gamma' z_i)}\right) \right] \tag{7}$$

Marginal Effects (ME)

In the probability models, estimated parameters do not necessarily reflect the marginal effects. Hence, one needs to derive the appropriate marginal effects as follows :

$$\frac{\partial E(PL)}{\partial x} = [\frac{\partial F(\beta' x)}{\partial(\beta' x)}] * \beta = f(\beta' x) * \beta \tag{8}$$

where f(.) is the density function corresponding to the cumulative distribution function F(.). In particular, the general expression, given above, will be modified if one makes use of the probit specification.

$$\frac{\partial E(PL)}{\partial x} = \Phi(\beta' x) * \beta \qquad (9)$$

where Φ(.) is the cumulative normal distribution function for the probit model.

5.2.1.2. Tobit Model

The probit model uses a dummy dependent variable. Alternatively, one can consider the determination of a continuous variable, namely, the total regular labour-hours (SPLHR) used by a farm.

Suppose the dependent variable (y_i) of interest is SPLHR[4] which is zero for the farms not hiring regular labour. The distribution of SPLHR can be considered to be a censored one, with the cut-off point being zero. Hence, a tobit specification is used to find out the determinants of the demand for regular labour-hours. The tobit model can be specified as follows.

$$\begin{aligned} y_i &= \beta' x_i + u_i \quad \textit{if} \quad RHS > 0 \\ &= 0 \quad \textit{otherwise} \end{aligned} \qquad (10)$$

where β is the vector of unknown parameters and x is the vector of explanatory variables; u's are the random terms distributed normally with mean zero and common variance σ^2.

Suppose n_1 is the number of observations for which $y_i = 0$ and n_2 the number of observations for which $y_i > 0$. Given these specifications, following Maddala (1983), the tobit likelihood function can be written as follows.

$$\ln L_T = \sum_0^{n_1} \log(1 - \Phi_i) + \sum_1^{n_2} \log \frac{1}{\sqrt{2\pi\sigma^2}} - \sum_1^{n_2} \frac{1}{2\sigma^2} (y_i - \beta' x_i)^2 \qquad (11)$$

where Φ_i is the cumulative normal distribution function. We maximise the likelihood function to obtain the parameters β, σ^2.

If, however, heteroscedasticity is present, the maximum likelihood estimates of the parameters will be inconsistent. Hence, one needs to correct for heteroscedasticity. As in the probit case, a multiplicative heteroscedasticity is assumed as follows :

[4]Since log is a monotonic transformation, if we use LNSPLHR (natural logarithm of SPLHR) as the dependent variable, the basic properties of a tobit model remains; moreover, since SPLHR ≠ 1 for any individual in the sample, the distribution of LNSPLHR does not censor any positive observation.

$$\sigma_i^2 = \exp\,(\alpha' z_i) \tag{12}$$

where z_i is a subset of x causing heteroscedasticity. Replacing σ with σ_i in the log-likelihood function and including σ_i^2 in the summation adjusts for the presence of heteroscedasticity. The final task is to find out the maximum likelihood estimates of β and α[5].

Tobit Marginal Effects

The marginal effects of a tobit model can be calculated as follows.

$$\frac{\partial E(PL/x)}{\partial x} = \phi\left(\frac{\beta' x}{\sigma}\right)\beta \tag{13}$$

5.2.1.3. Model Specification

We use the same set of explanatory variables in the probit and tobit regressions. The difference arises with respect to the dependent variable. It is a dummy variable (PL) in the probit model while it is a continuous variable (LNSPLHR) in the tobit model.

The primary arguments of the 'implicit contract model' developed in chapter two are related to sharing risks between farms and workers and minimising hoarding costs of regular labour. Risk-sharing takes place because farms are wealthier and hence, less risk-averse than the workers. A particular distinction is made between small and large farms; large farms not only own a larger quantity and better quality of land (as reflected in plot value per acre), but also own more non-land resources per acre so that they have higher income too (see chapter three). By virtue of their income and wealth (due to the ownership of more land and non-land resources), larger farms are expected to be less risk-averse compared to the smaller ones. Hence, the variables which add to a farm's income and/or wealth are expected to reduce the degree of risk-aversion of the farm.

Secondly, farm size is also the determinant of hoarding costs. Given other things, larger farms have greater demand for labour. This, in turn, means that the larger the labour demand, the smaller are the hoarding costs of maintaining a steady pool of regular labourers. Hence, larger farms with lower hoarding costs are capable of hiring more regular labour.

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[5] However, note that these estimates are to be interpreted keeping in mind the instability of tobit maximum likelihood estimates.

The following explanatory variables are used to determine the farm's choice of regular contracts.

$$X = (ONE\ ,\ LNIRR\ ,\ LNSFLHR\ ,\ LNPLOTVA\ ,\ LNFEQVAL\ ,\ OBUL\ ,\ TYPE\ ,\ AUREPALLE\ ,\ KANZARA\ ,\ YEAR80\ ,\ YEAR81\ ,\ YEAR82\ ,\ YEAR83) \quad \textbf{(14)}$$

Alternatively, one can replace the dummy variable TYPE by a continuous variable LNCULT as follows:

$$X' = (ONE\ ,\ LNIRR\ ,\ LNSFLHR\ ,\ LNPLOTVA\ ,\ LNFEQVAL\ ,\ OBUL\ ,\ LNCULT\ ,\ AUREPALLE\ ,\ KANZARA\ ,\ YEAR80\ ,\ YEAR81\ ,\ YEAR82\ ,\ YEAR83) \quad \textbf{(15)}$$

The original probit and tobit models are also corrected for the presence of heteroscedasticity. Assuming that the continuous variables cause heteroscedasticity, two sets of specifications, namely, Z and Z,' may be used as corresponding to X and X', respectively.

$$\begin{aligned} Z &= (LNIRR\ ,\ LNSFLHR\ ,\ LNPLOTVA\ ,\ LNFEQVAL) \\ Z' &= (LNCULT\ ,\ LNIRR\ ,\ LNSFLHR\ ,\ LNPLOTVA\ ,\ LNFEQVAL) \end{aligned} \quad \textbf{(16)}$$

As mentioned before, the explanatory variables are chosen in such a way that they primarily reflect risk-sharing and hoarding costs minimisation as implied by the implicit contract model (see chapter two); sometimes they may also account for the costs of supervision which may be an additional consideration for farms.

Irrigation plays a significant role in many ways. Firstly, irrigation adds to a farm's wealth by enhancing the plot value per acre. Usually larger farms are the ones who possess irrigated land. Secondly, irrigation introduces the possibility of multiple cropping that generates a year-round demand for labour. Hence, irrigated farms need more labour throughout the year and thus hoarding costs are lower in these farms. This may be ensured by hiring regular farm labourers and offering them additional facilities (which may also induce regular labourers not to quit the job). Finally, irrigated land has to be irrigated regularly by using labour and the task of irrigation is difficult to supervise (Agarwal, 1981; Eswaran & Kotwal, 1985a). Hence, farms may employ regular labourers to ensure no-shirking in irrigation (see chapter two).

The ownership of farm equipments is significant in different ways. On the one hand, it implies that the farm, in question, is a wealthy one and, hence, less risk-averse; they can offer some regular contracts to insure labourers against the fluctuations of wages and employment. Secondly, it may require a greater skill to perform the tasks using various farm machineries. Very often, these are also the tasks difficult to supervise. Hence, these tasks are not expected to be done by the labour hired on a casual basis, enhancing the likelihood of employment of regular labour. Thirdly, use of farm equipments may also have an adverse effect on the demand for regular labour (see Agarwal, 1981); e.g., use of farm equipments such as a thresher may reduce the demand for labour. In other words, the ownership of farm equipments may have a positive and/or negative effect on the demand for regular labour so that the net effect may be insignificant, if the positive and negative effects outweigh each other.

The variable OBUL denotes whether the farm, in question, uses its own bullocks and/or buffaloes in cultivation. Livestock is also an important form of wealth and, hence, it may enhance a farm's ability to share risk with the regular labourers. Secondly, tending and feeding livestock are year-round activities which generates a steady demand for labour throughout the year. Therefore, labourers hired to perform these tasks will entail lower hoarding costs, thus justifying the employment of regular labour. Thirdly, tending, feeding and grazing livestock are usually done on the fields away from the farm. Hence, the farmer cannot always keep an eye on these labourers. Moreover, tasks involving the use of livestock like ploughing or irrigation are difficult to supervise. Consequently, a farm may have the incentive to offer regular farm contracts with additional incentives so as to induce labourers not to quit and not to shirk. However, in the study villages, farmers often make a distinction between the regular farm servants who look after the cattle and those who participate in cultivation. The latter are called ploughmen (also see Binswanger et al. 1984) who are primarily entrusted with the responsibility of cultivation and not looking after the farmer's livestock. Instead of using ploughmen, farmers sometimes use family labour to perform the jobs using their own bullocks while young regular labourers look after the cattle without participating in farming. This means that use of own bullocks in cultivation may not necessarily be regular-labour-augmenting.

Besides animal labour, labour-hours supplied by the family members (LNSFLHR) is also used as an explanatory variable. It can be argued that family labour acts as a substitute for regular labour (also see discussion in chapter four). On the other hand, there may be a complementarity between family and regular labour so that irrespective of a fixed supply of family labour farms may maintain a steady pool of regular labour to meet the steady demand for labour throughout the year. This may arise because regular labourers may be more skilled, especially in certain tasks like ploughing, irrigation or fertilisation. In other words, net effect of the use of family labour in production may be positive or negative on output; it may even be non-significant, if positive and negative effects outweigh each other[6].

Finally, the dummy variable denoting landholding status of the farm (TYPE) is included as a regressor. In an alternative specification X', the dummy variable reflecting landholding status is replaced by a continuous farm size variable LNCULT. In addition, two sets of dummy variables, namely, village and year dummies are included in the regression. Among the village dummies, AUREPALLE and KANZARA are used; the third village dummy SHIRAPUR is excluded to get rid of the dummy variable trap[7]. The sample includes observations over five years. Hence, four year dummies, namely, YEAR80, YEAR81, YEAR82, YEAR83 are included while the fifth one YEAR84 is excluded in order to avoid the dummy variable trap. These village and year dummies are expected to account for the variation in the demand for regular farm servants across villages and over time.

The mean and standard deviation (SD) of the explanatory variables over the five-year period are shown in table 2.1.3.

5.2.2. Probit and Tobit Estimates

This section maximises probit and tobit likelihood functions to estimate the parameters of the respective model and examines these parameter estimates with respect to hypothesis H2. As mentioned in section 5.2.1.3, two specifications of the explanatory variables, namely, X and X' are used; the difference between these two specifications is that in X' landholding status variable TYPE is replaced by the farm size variable LNCULT which is a continuous variable. However, in view of the fact that specification X' is more informative (see section 5.2.2.1), specification X is dropped in the case of the tobit estimation.

5.2.2.1. Probit Estimates

Probit estimates of the parameters with respect to specifications X and X' are

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[6]There may also be some complementarities beteen regular and casual labour, e.g., because regular labourers are used to supervise casual labourers, as well as substitution effects. The regression equation used to analyse the determinants of regular labour use is best interpreted as a 'reduced form' equation of a simultaneous-equation model involving the simultaneous determination of regular and casual labour use.

[7]These village dummies are naturally dropped when we consider regressions for individual villages.

presented in tables 2.2.1 and 2.2.1' respectively; marginal effects are shown in the third column of each table and t-ratios are given in the parentheses. Heteroscedasticity-corrected estimates are shown in table 2.2.1'''.

First the goodness of fit measures (see Appendix 3) are considered. Values of LR statistics are 156.52 and 203.26 respectively for specification X and X', respectively; these chi-square statistics with degrees of freedom equal to 12 are significant in each case, thus justifying the joint significance of the parameters of the model. The number of correct predictions is 370 in specification X, while it is 386 in specification X', out of a total of 422.

Secondly, the normality assumption of the probit model is examined. In this respect, too, a likelihood ratio (LR) statistic (see Appendix 3) is constructed. Values of these LR statistics are 2.86 and 0.60 for specifications X and X', respectively. Neither of the LR statistics are significant[8]; we, therefore, accept the null hypothesis that the random terms are normally distributed.

A serious problem which often arises in cross-section analysis is that of heteroscedasticity when the disturbance variance is not constant across observations. Testing for heteroscedasticity in a limited dependent model (probit /tobit /logit model) is not very common. However, certain tests are available in the recent literature (e.g., Davidson & Mackinon, 1984; Pagan and Vella, 1990). Following Greene (1990), we have used a likelihood ratio test for heteroscedasticity which follows a chi-square distribution with degrees of freedom equal to the number of the variables causing heteroscedasticity[9].

We run two sets regressions using the probit model with the second one corrected for heteroscedasticity. Probit estimates are corrected for the presence of heteroscedasticity in the continuous variables (see Greene, 1992). The set of variables causing heteroscedasticity are Z and Z' corresponding to our specifications X and X' respectively (see section 5.2.1.3). Corrected set of estimates in each case are presented in table 2.2.1". Now for each specification, we not only estimate β's, but also γ's (which correspond to the set of variables causing heteroscedasticity).

We compare the original probit model with the corrected one. To this end, likelihood ratio (LR) statistics are computed for specifications X and X' where the degree of freedom is equal to the number of restrictions (i.e., the number of variables causing heteroscedasticity)

[8]Critical values of chi-square with one degree of freedom are 3.84 and 6.63 at 5% and 1% levels of significance, respectively.

[9]The chi-square distribution of the LR statistics depend on the normality assumption of the random variables. Since the hypothesis of normality is not rejected in each probit specification, there is a good justification for using this test.

as follows :

$$LR(X) = 2(-114.4186+125.2055) = 21.5738 \Rightarrow \chi^2_4{}^{10}.$$
$$LR(X') = 2(-91.4430+101.8334) = 20.7808 \Rightarrow \chi^2_5$$

Both the chi-squares are significant[11] and therefore the hypothesis of homoscedasticity cannot be accepted. Both the likelihood ratios statistics (chi-square) are significant here. We, therefore, accept the estimates corrected for heteroscedasticity (table 2.2.1") which are as follows :

$$\begin{aligned} Y_i &= \hat{\beta}'(X)_i + \hat{\gamma}(Z)_i \\ &= -\ 286.17 + 82.49\ \mathit{LNIRR} + 8.03\ \mathit{LNSFLHR} + 1.44\ \mathit{LNPLOTVA}* - 21.31\ \mathit{LNPLOTVA} \\ &\quad + 7.61\ \mathit{LNFEQVAL}* + 2.35\ \mathit{OBUL} + 4.99\ \mathit{TYPE} + 191.26\ \mathit{AUREPALLE} + 130.91\ \mathit{KANZARA} \\ &\quad + 57.35\ \mathit{YEAR80} - 0.03\ \mathit{YEAR81} - 8.90\ \mathit{YEAR82} + 0.04\ \mathit{YEAR83} \qquad \textbf{(17)} \end{aligned}$$

$$\begin{aligned} Y_i &= \hat{\beta}'(X')_i + \hat{\gamma}(Z')_i \\ &= -262.95 + 33.97\ \mathit{LNIRR} - 5.83\ \mathit{LNSFLHR}* - 42.03\ \mathit{LNPLOTVA} + 13.86\ \mathit{LNFEQVAL} \\ &\quad + 17.16\ \mathit{LNCULT}* + 4.64\ \mathit{OBUL} + 235.79\ \mathit{AUREPALLE} + 189.05\ \mathit{KANZARA} \\ &\quad + 50.94\ \mathit{YEAR80} - 34.47\ \mathit{YEAR81} - 33.09\ \mathit{YEAR82} + 18.84\ \mathit{YEAR83} \qquad \textbf{(18)} \end{aligned}$$

where '*' denotes that the variable concerned is significant and $\hat{\beta}$, $\hat{\gamma}$ are the estimates of β and γ, respectively.

Dummy variable TYPE is not significant in specification X; but the continuous farm size variable LNCULT is positive and significant in specification X'. It, therefore, implies that the larger the farm size, the greater is the likelihood of employing regular labour. However, plot value per acre is significant in specification X. Given that there is a strong correlation between the quantity and quality of land in the study villages (see chapter three), it suggests that farms with a higher plot-value are the larger farms who have a greater likelihood of employing regular labour.

The variable LNSFLHR is negative and significant in the corrected model with specification X' (but is not significant in specification X), which suggests that there is a

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[10]The subscript denotes the degrees of freedom.

[11]Critical values of chi-square with a degree of freedom equal to 4 are 9.4877 and 13.2767 at 5% and 1% levels of significance, respectively while those with a degree of freedom equal to 5 are 11.0705 and 15.0863 at 5% and 1% levels of significance, respectively.

substitutability between family labour and regular labour, at least to some extent; if the supply of family labour goes up, there is a likelihood that some regular labour demand will be curtailed.

However, the ownership of farm equipments is both positive and significant in specification X which is not so in specification X'. In the latter case, though still positive, it is not significant. This suggests that, in specification X, farm equipment has a favourable effect on the employment of regular labour. However, in specification X' it may happen the positive and negative effects of farm equipments on the demand for regular labour outweigh each other so that the net effect becomes insignificant.

Other variables like OBUL or LNIRR are positive, though not significant; similarly, the village and year dummies are found to be insignificant. This is true for both probit specifications X and X', indicating that village specific demand factors are not significant to determine the demand for regular labour.

Next we determine the demand for regular labour-hours for two of the study villages, namely, Aurepalle and Kanzara, individually[12]. Using specification X' (but excluding the village dummies), we estimate farms' choice of contract for Aurepalle and Kanzara (see table 2.2.1'.a). In addition to farm size (LNCULT), two variables are statistically significant for these villages. These are LNSFLHR and LNFEQVAL; while LNFEQVAL has a favourable effect on the probability of hiring regular labour, LNSFLHR has a negative effect. These results, too, support those obtained from the pooled sample explained above. Moreover, a likelihood ratio statistic of heteroscedasticity suggests that the assumption of homoscedasticity cannot be rejected in the subsample of Aurepalle and Kanzara.

5.2.2.2. Tobit Estimates

Secondly, a tobit model is estimated to determine the demand for regular labour-hours. As already mentioned, we confine ourselves to specification X' only which uses a continuous farm size variable (LNCULT). Both original and corrected tobit models are estimated as shown in tables 2.2.2 and 2.2.2'. The advantage with the tobit specification is that it uses a continuous dependent variable, namely, LNSPLHR as opposed to a dummy dependent variable (PL) used in the probit model which loses some available information.

Tobit marginal effects (ME) along with the respective t-ratios (given in parentheses)

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[12]In this case, we exclude Shirapur since the chi-square statistic between landholding status and type of contract is not significant for the village.

are shown in the third column of table 2.2.2[13]. The Wald statistic (which follows a chi-square distribution) is significant, indicating the joint significance of the parameters of the model.

Secondly, we test for the normality of the tobit random variable. Using the likelihood ratio (LR) test (see Appendix 3), we compute an LR statistic equal to 3.06 which follows a chi-square distribution. However the critical values of chi-square with degree of freedom equal to 2 exceed the computed value of the statistic both at 5% and 1% levels of significance. Hence, in the light of our sample, we accept the null hypothesis that the random variable is normally distributed.

Finally, we correct for heteroscedasticity in the continuous regressors. Corresponding to specification X', we use the set of continuous explanatory variables Z' causing heteroscedasticity. Heteroscedasticity corrected estimates are presented in table 2.2.2'. Besides σ^2, two sets of parameters, namely, β's and α's are obtained corresponding to two sets of variables X' and Z' (see section 5.2.1.2).

The original and corrected tobit models are compared to test for the assumption of homoscedasticity. To this end, a likelihood ratio test (see Appendix) is computed where the degree of freedom is equal to the number of restrictions (i.e., the number of variables causing heteroscedasticity). The LR statistic is as follows :

$$LR(X') = 2(-294.0393+300.1706) = 12.2626 \Rightarrow \chi^2_5$$

The computed value of the chi-square statistic exceeds the critical value at the 5% level of significance[14] and, hence, the hypothesis of homoscedasticity cannot be accepted. In other words, we accept the corrected tobit regression as follows.

$$\begin{aligned} Y_i &= \hat{\beta}' (X')_i + \hat{\alpha}' (Z')_i \\ &= -14.23 + 2.17\, LNIRR* - 0.78\, LNSFLHR - 0.15\, LNSFLHR* - 1.07\, LNPLOTVA \\ &\quad + 1.13\, LNFEQVAL* - 0.03\, LNFEQVAL + 4.17\, LNCULT* - 3.96\, OBUL* + 8.65\, AUREPALLE \\ &\quad + 4.27\, KANZARA* + 0.82\, YEAR80 - 1.47\, YEAR81 - 1.89\, YEAR82 - 0.51\, YEAR83 \end{aligned} \tag{19}$$

where '*' denotes that the variable concerned is significant and $\hat{\beta}$, $\hat{\alpha}$ are the estimates of β and α, respectively.

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[13]Given the more satisfactory result with respect to specification X' (see section 5.2.2.1), we continue to run the regression only with respect to X' and exclude specification X.

[14]The critical values of chi-square with a degree of freedom equal to 5 are 11.0705 and 15.0863 at 5% and 1% levels of significance, respectively.

As in the probit model (w.r.t. specification X'), the farm size (LNCULT) is not only positive, but also significant. This means, the larger the farm size, the greater is the demand for regular labour-hours. Moreover, the quality of land, as reflected in the access to irrigation facilities (LNIRR) is positively significant; therefore, access to irrigation is likely to enhance the demand for regular labour. This is because both farm size and irrigation facilities lower hoarding costs.

As in the probit model, family labour-hours (LNSFLHR) is negatively significant in the corrected tobit model suggesting a substitutability between family labour and regular labour. In addition, the ownership of animal labour (OBUL) is significant, though negative. This perhaps indicates the fact that sample farms with own bullocks use more family labour in the operations involving the use of bullocks[15]. The negative significance of both LNSFLHR and OBUL together may imply that family labour is used to perform the operations with own bullocks, thus reducing the demand for regular labour-hours.

In addition, the coefficient of LNFEQVAL is positive and also significant in the corrected tobit model, thereby implying that the ownership of farm equipments has a significantly favourable impact on the demand for regular labour. Finally, we consider the coefficients of the village dummies. Both the dummies are not only positive, but also significant, suggesting that village-specific demand factors are significant in explaining the demand for regular labour.

Finally, using specification X' (excluding the village dummies) we estimate the tobit model to determine the demand for regular labour-hours in Aurepalle and Kanzara separately (see table 2.2.2.a). The variables which are statistically significant are LNCULT, LNFEQVAL and LNSFLHR. More interestingly, a likelihood ratio test of heteroscedasticity suggests that the assumption of homoscedasticity cannot be rejected for the sample. Hence, we consider the original (uncorrected) tobit estimates only for the individual villages.

A comparison of the probit estimates with the tobit ones (with respect to specification X' only) shows that the tobit estimates are more efficient. The value of the tobit likelihood function is higher. Secondly, values of the tobit t-ratios are greater, thereby implying that tobit estimates have lower standard errors. The difference may be attributed to the fact that the dependent variable of the tobit model is a continuous variable (LNSPLHR) as opposed to a dummy variable (PL) in a probit model, thereby, supplementing information. Signs of the estimated coefficients are very similar in these two models; however, a number of

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[15]One possible reason for the negative coefficient of OBUL could have been the tractor use. Because where tractors are used, oxen are not needed (tractors are driven by regular labour). However, use of tractors is extremely limited in the study villages.

variables which are not significant in the probit model become significant in the tobit model.

5.2.3. Significance of Hoarding Costs

So far all the sample farms are considered in our estimation, some of which hire regular labour while others do not. In this section, however, we intend to consider the farms hiring regular labour only. The idea is as follows; if LNSPLHR is still found to be positively related to the farm size variable LNCULT (despite the fact that an hour of regular labour has zero marginal cost), there would be some confirmation for the notion of a 'hoarding cost' of regular labour on the smaller farms. Indeed, if there is no hoarding, we should find that a farm's regular labourer is fully employed irrespective of the size of the farm[16].

5.2.3.1. A Truncated Model

To this end, we first choose a subset of the sample farms which hire regular labour (SPLHR > 0). Using a truncated regression equation, we regress LNSPLHR on the same set of explanatory variables X'. There are 79 farms in three of the study villages and SPLHR > 0 for each farm in this sub-sample.

As in the tobit model, the dependent variable of regression is the natural logarithm of SPLHR (LNSPLHR). The distinction in the truncated model arises from the fact that we *truncate* the distribution at zero. In a tobit model, however, the distribution is *censored* at zero. Under the conditions, the simplest possible regression framework is as follows :

$$\begin{aligned} LNSPLHR_i &= \beta' X_i' + u_i \\ \text{where} \quad u_i &\sim N(0\ ,\ \sigma^2) \end{aligned} \qquad \textbf{(20)}$$

where X' is the set of explanatory variables and β is the vector of parameters to be estimated as defined in section 5.2.1.3. Estimates are shown in table 2.3.2.

Next we repeat the same exercise for the *farms hiring only* *<u>one</u>* *regular labour* in the study villages. This is because of the fact that if there is no hoarding, '*single*' regular labour will be fully employed irrespective of farm size. There are 38 farms which hire only one

[16]This argument may not apply when some farms employ more than one regular labourer. In that case, we would expect LNSPLHR to be positively related to farm size, even if there are no hoarding costs (i.e., even if regular labourers employed throughout the year), because farms employing more than one regular labourer will tend to be the larger ones. For this reason, we run the regressions both (i) on the sample of all farms employing one regular labourer or more, and (2) on the sample of farms employing one regular labourer only.

regular labour in the study villages. Using the same set of explanatory variables, we determine the demand for regular labourers for these farms. These estimates are shown in table 2.3.2'.

5.2.3.2. Parameter Estimates

Table 2.3.2 shows the ordinary least squares estimates as well as truncated regression estimates obtained from *the sub-sample of farms hiring regular labourers*. T-ratios are given in parentheses. The results are as follows. Farm size (LNCULT) is positive and significant among the farms hiring regular labourers. Given that the marginal costs of regular labour are zero, significance of the farm size variable among the sample of farms hiring regular labourers, to some extent, confirms that these farms face hoarding costs while employing regular labour. Accordingly, larger farms (with lower hoarding costs) are able to hire regular labourers. The variable indicating land quality like irrigation is also significant in this sub-sample. The significance of farm size and irrigation facilities, both of which enhance the demand for labour among the farms hiring regular labour, strengthens the hoarding costs argument.

The coefficient of family labour is negative and statistically significant, thereby implying a substitutability between family and regular labour-hours among the farms hiring regular labour. However, unlike the tobit model, the coefficient of OBUL is now positive (though not significant) among the farms hiring regular labourers. This suggests that *farms hiring regular labour* use them to perform operations with the help of farm bullocks.

Secondly, we compare truncated estimates of the sub-sample with the tobit estimates for the overall sample (see section 5.2.2.2). It suggests that the inferences drawn from the tobit model remain unchanged for farm size (LNCULT), irrigation (LNIRR) and family labour-hours (LNSFLHR) in the sub-sample as well. However, in contrast to the tobit model, the coefficient of OBUL becomes positive in the sub-sample suggesting that the ownership of livestock definitely enhances the demand for regular labour *among the farms hiring regular labour*. Ownership of farm equipments (LNFEQVAL) is no longer significant in the truncated model. We also find that the standard errors of estimated LNCULT and LNSFLHR are less in the truncated model, suggesting a better precision of these estimates.

Finally, we consider the *farms hiring only <u>one</u> regular labour* (see table 2.3.2'). Farm size variable LNCULT continues to be highly statistically significant even when we consider the demand for regular labour-hours by these farms; this suggests that there are significant hoarding costs among the smaller farms. As before, the coefficient of family labour-hours is negative and it is significant. However, in this sub-sample of farms hiring only one regular labour, other factors of production like area irrigated, use of own bullocks, value of plots per acre and farm equipments are not found to be significant.

5.3. Simultaneous Determination of the Choice of Regular Contract and Demand for Regular Labour-Hours

So far the choice of labour contract is determined by the probit model independently of the demand for regular labour-hours in a tobit framework. However, the decision as to how much regular labour to hire is conditional on the first decision whether to hire any regular labour or not. In this section, we shall jointly determine these two decisions as follows. First the farm decides whether to hire a regular labour or not; if yes, the farm decides how many regular labour-hours to hire. Using a 'double-hurdle' model (Cragg, 1971; Atkinson, Gomulka and Stern, 1984), these two decisions are determined where the first hurdle is determined by a probit-criterion equation choosing the type of the contract to be offered and then selecting the cases where regular labourers are hired, a truncated model is used to determine the demand for regular labour-hours.

5.3.1. A Double-Hurdle Model

Suppose the demand for regular labour-hours is denoted by $q_i \geq 0$. Zeros may arise either because the farm in question does not intend to hire regular labour or because the farm's intention to hire regular labour is constrained by its ability to do so. The latter may occur because the farm is small (and hence, have significant 'hoarding costs' of regular labour) or because the farm does not have access to irrigation (so that it does not have a steady demand for labour throughout the year), etc. Let q_i be related to an unobserved variable q_i^* as follows: :

$$\begin{aligned} q_i &= \max(q_i^* \ , \ 0) \\ where \ \ q_i^* &= \delta' w_i + v_i \\ v_i &\sim N(0 \ , \ \sigma_v^2) \end{aligned} \tag{21}$$

Let us now define the contract variable p_i such that it takes a value 1 if the i-th farm hires regular labour, and zero otherwise. p_i is related to an unobserved variable p^*_i[17] as follows:

$$\begin{aligned} p_i &= 1 \quad \textit{if } p_i^* > 0 \\ &= 0 \quad \textit{if } p_i^* \leq 0 \\ \textit{where} \quad p_i^* &= \beta' x_i + u_i \\ \textit{s.t.} \quad u_i &\sim N(0\ ,\ \sigma_u^2) \end{aligned} \tag{22}$$

The set of independent variables x_i explaining p_i^* and the set of variables w_i explaining q_i^* by the i-th farm, i = 1, 2,..., n, may have some variables in common; however, there needs to be some identifying variables between these two decision variables. Secondly, u_i and v_i are assumed to be independently and identically distributed; they are also assumed to be uncorrelated. In this framework, p_i and q_i are assumed to be related as follows :

$q_i > 0$ iff $p_i^* > 0$, $q_i^* > 0$
$q_i = 0$ iff either $p_i^* \leq 0$ or $q_i^* \leq 0$ or both

Given this set-up, the following probabilities can be calculated :

$$\begin{aligned} Prob[p_i = 1] &= Prob[p_i^* > 0] = \Phi(\beta' x_i) \\ Prob[q_i > 0] &= Prob[q_i^* > 0] = \Phi(\frac{q_i^* - \delta' w_i}{\sigma_v}) \end{aligned} \tag{23}$$

where $\Phi(.)$ is the cumulative normal distribution function and σ_v is the standard deviation of v_i.

If $p_i^* > 0$, i.e, if $p_i = 1$, a truncated regression in ($\delta' w_i$) applies (when $q_i > 0$) so that the log-likelihood function of the double-hurdle model can be written as follows :

$$lnL_{DH} = \sum_{q_i = 0} \ln\left[1 - \Phi(\beta' x_i)\ \Phi\left(\frac{\delta' w_i}{\sigma_v}\right)\right] + \sum_{q_i > 0} \left[\ln \phi\left(\frac{q_i^* - \delta' w_i}{\sigma_v}\right) + \ln \Phi(\beta' x_i)\right] \tag{24}$$

where ϕ is the normal density function.

Using a likelihood ratio (LR) statistic, a double-hurdle model can be compared with

[17]It is to be noted here that the determinants of p_i are unobservable, but not pi.

a tobit model as follows :

$$LR = 2(lnL_{DH} - lnL_{tobit}) \sim \chi^2_p \qquad (25)$$

where L_{DH} and L_{tobit} are the log-likelihood functions of double-hurdle and tobit models, respectively. The likelihood ratio (LR) statistic follows a chi-square distribution where the degrees of freedom are determined by the number of regressors p in the probit criterion equation. Finally, we maximise the log-likelihood function of the double-hurdle model to find the estimates of β, δ and σ^2_v.

5.3.2. Model Specification

There are two hurdles to be determined in a double-hurdle model. The first hurdle relates to the decision whether the farm, in question, wishes to hire regular labour or not which is not observable. However, the dependent variable in the second hurdle equation is the actual number of regular labour-hours hired by each farm in the sample which is observable.

Given that larger farms own more land and non-land resources, explanatory variables of the probit criterion equation are assumed to be as follows : intercept term (ONE), amount of land cultivated (LNCULT), amount of land irrigated (LNIRR), number of family labour-hours used in cultivation (LNSFLHR) and value of farm equipments owned by the farm (LNFEQVAL).

At the second step, given the choice of contract, there are farms who actually hire regular labour. The second hurdle determines how many regular labour-hours (LNSPLHR) are to be used; in this case, the explanatory variables are the same as before, i.e., the set of variables included in X' (see section 5.2.1.3). Hence, the identifying variables are LNPLOTVA, OBUL, AUREPALLE, KANZARA, YEAR80, YEAR81, YEAR82 and YEAR83, variables that are not included in the probit criterion equation.

LIMDEP, the computer programme, at our disposal, gives a routine for a particular variant of the double-hurdle model where the dependent variable in the probit-criterion equation is observable. This is, however, not the case here. Hence, we write a special programme to obtain the maximum likelihood estimates of the double-hurdle model[18].

5.3.3. Parameter Estimates

Estimates of the double-hurdle model as specified in section 5.3.2. are shown in table 3.3.

First we consider the estimates of the probit criterion equation. Our estimates indicate that larger farms with greater irrigation facilities, and farm equipments are more likely to offer regular contracts. However, the greater the supply of family labour, the lower is the likelihood of offering regular contracts which supports the earlier result that family labour acts as a substitute for regular labour.

Next we consider the estimates of the second hurdle as indicated by the estimates of the truncated model. Farm size (LNCULT) is highly significant in determining the demand for regular labour. Given that the marginal cost of regular labour is zero, the significance of farm size in the truncated model (which considers only the farms actually hiring regular labour) implies that hoarding cost considerations are significant for farms such that smaller farms do not hire regular labour; this, in turn, strengthens the result obtained from the truncated regression model in section 5.2.3.

In addition, plot value per acre and farm equipment value favourably and significantly affect the farm's decision as to how much regular labour to hire. Use of family bullocks in cultivation also exerts a significantly positive impact on the amount of regular labour hired by the farm.

The effect of family labour-hours on the demand for regular labour is, however, negative. This suggests that there exists a substitutability between family labour and regular labour which is compatible with the 'hoarding cost' argument.

5.3.4. A Comparison with Tobit Estimates

We construct a LR statistic to compare the double-hurdle model with the tobit model:

[18] I am indebted to Joanna Gomulka at the STICERD, London School of Economics who has written the programme required for the estimation of the double-hurdle model.

$$\begin{aligned} LR &= 2(\hat{L}_{DH} - \hat{L}_{tobit}) \\ &= 2(-159.148465+227.574453) \\ &= 136.8519 \end{aligned} \tag{26}$$

The LR statistic is significant at the 1% level of significance which, in turn, implies that estimates of the double-hurdle model is a significant improvement over those of the tobit model.

Secondly, estimates of the double-hurdle model justify the hoarding cost argument; farm size variable is highly statistically significant not only in the probit criterion equation, but also in the truncated regression determining the demand for regular labour-hours.

Thirdly, the coefficient of OBUL is negative in the tobit model (while it is positive, though not significant in the truncated model). In the double-hurdle model it is not only positive but also statistically significant.

5.3.5. An Overview

The econometric analysis carried out so far has been done in two steps. First, in a univariate framework, probit and tobit models were used to determine the choice of contract and demand for regular labour-hours respectively. In general, tobit estimates are found to be more informative because of the continuous nature of the dependent variable. In addition, we have estimated a truncated regression model to examine the significance of hoarding costs among the farms hiring regular labour. Secondly, in a bivariate framework, a double-hurdle model was estimated. The model jointly determines the choice of contract and demand for regular labour-hours. A comparison among probit, tobit and double-hurdle models shows that tobit estimates are better than the probit ones and double-hurdle estimates are better than the tobit estimates. The main findings, primarily with respect to hypothesis H2, are summarised below.

In addition to farm size, LNIRR, LNSFLHR, LNFEQVAL and OBUL are significant in the farm's decision to hire regular farm servants.

As expected, the size of the farm turns out to be the most important determinant in our analysis. It has been shown that larger farms not only have a greater likelihood of hiring regular labour, but they also demand more regular labour-hours. As already explained in the implicit contract model, there are two factors that determine the demand for regular labour-hours. The first argument is related to sharing risks between farms and workers. The larger the farm size (in quantity as well as in quality), the larger is the value of other non-land resources (e.g., livestock, irrigation facilities, farm equipments etc.) as well (see chapter three). These larger farms are wealthier and, hence, for all practical purposes, they can be considered to be risk-neutral compared to the smaller ones because these large farms can diversify their portfolio to hedge against risks. Hence, these farms are willing to insure a group of regular labourers against wage and employment fluctuations. Secondly, given the size factor, the demand for labour-hours is higher in large farms throughout the year a part of which may be attributed to greater irrigation facilities, generating a year-round demand for labour. Hence, the 'hoarding costs' of maintaining a steady pool of regular labourers are less in large farms, inducing them to demand more regular labour-hours. The fact that the hoarding cost constraint is more binding for small farms is not only confirmed by the positive significance of the farm size variable in the truncated regression on a sub-sample of farms hiring only one regular labourer (section 5.2.3), but also by the positively significant regression coefficient of farm size variable in the second hurdle of the double-hurdle model (section 5.3.3).

The significance of area irrigated (LNIRR) in all the models further strengthens the hoarding costs argument underlying the employment of regular labourers. The larger the area irrigated (which is also reflected in the plot value per acre), the greater is the demand for labour throughout the year and the lower are the hoarding costs of maintaining a fixed pool of regular farm servants. The variable LNIRR may also reflect the employment of regular labourers with a view to ensure no-shirking. Irrigation is an activity particularly difficult to supervise (Eswaran and Kotwal, 1985a). Hence, the greater the amount of irrigated land, the greater is the problem of supervision and the greater the likelihood of employing regular farm servants on irrigated land.

The coefficient of family labour-hours is negative, but not significant, in the probit model. In tobit and double-hurdle models, however, it is significant and negatively related to the farms' demand for regular labour-hours. This suggests that family labour-hours act as substitutes for regular labour-hours. Hence, the greater the supply of family labour, the lower is the demand for regular labour-hours so that the hoarding costs of labour are minimised.

The variable OBUL is negatively significant in the tobit model. However, it becomes positive among the sub-sample of farms hiring regular labour (though not significant) as well as in the double-hurdle model (where it is highly significant) so that the positive effect of the use of own bullocks outweighs the negative effect (see section 5.2.1.3). The result, therefore, suggests that the use of own bullocks raises the demand for regular labour-hours among the farms hiring regular labour (though it may be negative when all farms are taken together).

The value of farm equipments (LNFEQVAL) is positive and significant in tobit and double-hurdle models. On the one hand, tasks using farm equipments need better skill and may be more difficult to supervise, necessitating use of skilled regular labour. On the other hand, use of some farm equipments (e.g., threshers, sprayers) may reduce the demand for regular labour. However, the total effect of farm equipments on the demand for regular labour-hours is found to be significantly positive, suggesting that the positive effect outweighs the negative one.

Thus, the variables denoting the quantity (LNCULT) as well as the quality (LNIRR/LNPLOTVA) of landholding is a significant determinant of the demand for regular labour-hours. In addition, other factors of production like LNFEQVAL, OBUL and LNSFLHR are also found to be significant; while the first two have favourable impacts, the last one has usually a negative impact on the use of regular labour-hours.

The implications of our results are as follows :

(i) The argument of risk-sharing between farmers and workers is consistent with the evidence arising from these Indian villages where larger and, hence, wealthier farmers (who own better-quality land as well) hire more regular labour-hours.

(ii) More interestingly, the significance of farm size (quantity as well as quality) on regular labour-hours strengthens the 'hoarding costs' argument. Given that the marginal costs of regular labour are zero, the positive significance of the farm size variable confirms the significant hoarding-cost consideration among small farms[19].

Our evidences are, therefore, consistent with the implicit contract model developed in chapter two.

5.4. Types of Tasks and Choice of Contracts

So far our analysis has focused primarily on farm size and the significance of hoarding costs in the determination of farms' demand for regular labour. In this section, we consider the relevance of task characteristics and examine the validity of hypothesis H4 that labour contracts are allocated according to task characteristics in order to minimise

[19]We have not used the argument that farms using regular labour benefit from the greater timeliness with which tasks are completed. This is because by assumption there does not exist any excess demand for labour.

supervision costs.

The analysis is developed as follows. Section 5.4.1 examines whether there exist particular tasks which have a higher content of regular labour-hours relative to other tasks. In section 5.4.2, we distinguish between monitorable and non-monitorable tasks by examining the distribution of casual and regular labour-hours between these tasks. In doing so, we control for farm size and cropping pattern. Some chi-square test statistics are also computed to examine the degree of association between the type of tasks and that of contracts. Finally, in view of the fact that the demand for regular labour depends not only on the nature of the tasks, but also on farm size, irrigation facilities, supply of family labour-hours and the nature of the crop produced (as argued in sections 5.2 and 5.3), a multiple regression analysis is done in section 5.4.3 which makes use of tobit and truncated regressions.

5.4.1. Classification of Tasks and Distribution of Regular Labours

This section examines if there is a particular type of task which has a higher content of regular labour-hours. The analysis in this section is based on the information collected from the study villages, namely, Aurepalle, Shirapur and Kanzara over a period of five years (1980 to 1984).

The classification of tasks as based on the distinction between three types of tasks made in the ICRISAT studies are as follows:

Type-a : Field preparation, manuring, fertilization and irrigation
Type-b : Sowing, re-sowing, transplanting, weeding, interculturing (which is followed by a crop maturation period)
Type-c : Harvesting (main product and by-product), harvest processing

For each type of tasks, the total number of casual-labour (SCLHR) and regular-labour hours (SPLHR) used on different plots owned by a household are calculated from the VLS-Y2 schedule. Using this information, we compute the conditional probability of hiring regular labour as follows.

Suppose A_j denotes the event that there is a demand for labour to perform task type j, j = a, b, c while B_i denotes the event that the i-th combination of labour is hired, i = 1, 2, 3, accordingly as the farm hires only regular, only casual, or both regular and casual labour to perform task type j. Thus, three probabilities, namely, $Pr(B_1/A_j)$, $Pr(B_2/A_j)$ and $Pr(B_3/A_j)$ are calculated for the j-th type of task, j = a, b, c as defined above. Estimated values of these probabilities are shown in table 4.1[20].

The following inferences can be made from the above tables.

First we consider the employment of casual and regular labour in *task type 'a'*.

(i) Proportion of farms employing only regular labour is positive (0.16) in Aurepalle. However, it is close to zero in Shirapur (0.02) and zero in Kanzara. (ii) Proportion of farms employing only casual labour is high in Shirapur (0.66) and Kanzara (0.77) and moderately high in Aurepalle (0.33). (iii) The proportion of farms hiring both casual and regular labour is negligible in Shirapur (0.02), but moderate in Aurepalle (0.15) and Kanzara (0.15)[21].

Secondly, the employment of casual and regular labour in *task type 'b'* is considered.

(iv) The proportion of farms employing only regular labour is positive but negligible in Aurepalle (0.05), close to zero in Shirapur (0.02) and zero in Kanzara (0). (v) The proportion of farms using only casual labour is very high in Shirapur (0.89) and Kanzara (0.84) and moderately high in Aurepalle (0.41). (vi) The proportion of farms using both casual and regular labour is moderate in Aurepalle (0.26), low in Kanzara (0.14), and almost negligible in Shirapur (0.02).

Finally the employment of casual and regular labour in *task type 'c'* is considered.

(vii) The proportion of farms using only regular labour is zero in all the villages. (viii) The proportion of farms using only casual labour is moderately high in Aurepalle (0.51), and substantially high in Shirapur (0.95) and Kanzara (0.76). (ix) The proportion of farms using both casual and regular labour is moderate in Aurepalle (0.31), low in Kanzara (0.16), and almost negligible in Shirapur (0.03).

It follows that casual contracts dominate in all types of tasks, especially in task types 'b' and 'c' in the study villages. Even in task type 'a', the proportion of farms hiring only casual labourers is higher than that hiring only regular labourers. However, the relative use of regular labour-hours is higher in task type 'a' than that in task types 'b' and 'c'. On the other hand, relative use of casual labourers is higher in type 'b' and type 'c' tasks, especially in type 'c' tasks where no farm uses only regular labour.

On an average, use of regular labour is the lowest in Shirapur compared to that in Aurepalle and Kanzara. To some extent, this can be attributed to the drought-prone nature

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[20]Note that conditional probabilities are nothing but the relative frequencies which allow us to describe the farming practices in these villages as to how labour contracts are allotted according to tasks though the robustness of these probabilities may be questioned. However, our chi-square tests of independence as well as regression analysis (see section 5.4.3) offer statistically significant measures of the relationship between types of tasks and types of contracts in the study villages.

[21]Note that $Pr(B_1/A_j)+Pr(B_2/A_j)+Pr(B_3/A_j) \leq 1$ and the difference constitutes the use of family labour.

of the village (see chapters four and seven). Given a high risk of crop failure, very often even larger farmers in Shirapur are not willing to offer regular farm contracts. Secondly, from the workers' point of view, too, credit incentive to enter regular farm contracts is less in comparison to that in Aurepalle and Kanzara. As already discussed in chapter four, due to the government's active Drought-Prone Area Programme (DPAP), the credit constraint on the landless labourers is low in Shirapur than in the other two study villages. In other words, both demand and supply forces in Shirapur lead to a situation where the regular labour content of total hired labour is less than that in the other two study villages.

5.4.2. Monitorable and Non-monitorable Tasks

The definition of tasks, in this section, closely follows that in section 2.3 of chapter two. According to the need for supervision and the ease with which it can be undertaken, tasks are classified into monitorable and non-monitorable types to examine hypothesis H4 related to the task-based segmentation of the labour market between casual and regular contracts.

To this end, task types a, b and c are further classified as follows :

TASK = 1 if the labour concerned performs task type 'a'
= 0 if the labour concerned performs task type 'b' and/or 'c'.

If TASK is unity, tasks are called non-monitorable tasks; otherwise tasks are monitorable tasks[22]. This classification directly corresponds to that of Eswaran and Kotwal (1985a). In their notation, non-monitorable tasks are type I tasks while monitorable tasks are type II tasks. As argued in the 'shirking model' (see chapter two), tasks like field preparation, manuring, spreading fertilizer, irrigation are difficult to supervise and, hence, regular contracts are offered to perform these tasks with a view to discipline labour such that the regular wage per period is above the worker's reservation wage.

It has already been shown in sections 5.2 and 5.3 that the larger the farm size, the greater is the demand for regular labour-hours. The analysis in this section, therefore, considers only the labour hiring by the larger farms[23] which, to some extent, eliminates the effect of farm size on the choice of contract and focuses on the relationship between the type of tasks and the type of contracts prevailing in the study villages.

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[22]The distinction between monitorable and non-monitorable tasks is, of course, a simplification. In particular, there is likely to be a continuum of tasks based on their degree of monitorability.

[23]By larger farms, we refer to the farms belonging to the medium and large households in the ICRISAT specification; in other words, these are the farms for whom the landholding status variable TYPE = 1.

5.4.2.1. Distribution of Casual-Labour and Regular-Labour Hours in the Production of All Crops

In order to analyse the distribution of regular labour-hours between monitorable and non-monitorable tasks, we calculate here the conditional probability of hiring casual and regular labour. Let C_h denote the event that a large farm hires regular labour to perform a particular type of task h = 1, 0 accordingly as there is a demand for non-monitorable or monitorable tasks. As in section 5.4.1, we compute the conditional probability of employing regular and casual labour in monitorable and non-monitorable tasks in the study villages, namely, $Pr(B_1/C_h)$, $Pr(B_2/C_h)$ and $Pr(B_3/C_h)$ according to whether (i) farms employ only regular labour ($Pr(B_1/C_h)$), (ii) farms employ only casual labour ($Pr(B_2/C_h)$) and (iii) farms employ both casual and regular labour ($Pr(B_3/C_h)$) respectively where h = 1, 0 accordingly as labour is hired for non-monitorable and monitorable tasks respectively. The estimated probabilities are presented in table 4.2.1.

In Aurepalle, the probability that large farms employ only regular labourers in *non-monitorable* tasks is higher than that employing only casual labourers or that employing both casual and regular labour. However, the same does not hold good in Shirapur or Kanzara. In Kanzara, $Pr(B_1/C_1)$ is zero while it is close to zero in Shirapur (0.01). In contrast, the probability of hiring only casual labour is higher even in the non-monitorable tasks[24] in Shirapur and Kanzara. However, a moderate number of farms, 23% in Aurepalle and 24% in Kanzara, use both casual and regular labour to perform non-monitorable tasks; in Shirapur, the probability of using both casual and regular labour is negligible (0.01).

Next the conditional probabilities of hiring casual-labour and regular-labour hours or both for *monitorable* tasks are considered. None of the large farms in the study villages use only regular labour to perform these tasks so that $Pr(B_1/C_0)$ is equal to zero in each case. However, the proportion of farms using only casual labour ($Pr(B_2/C_0)$) is higher than that using both casual and regular labour ($Pr(B_3/C_0)$) in Shirapur and Kanzara, but it is the other way round in Aurepalle.

A comparison of the probability of hiring only casual labourers between non-monitorable and monitorable tasks shows that in each of the study villages, $Pr(B_2/C_0)$ is higher for the monitorable tasks. This implies that more regular or family labour is used to perform the non-monitorable tasks. Also, the proportion of farms using both casual and regular labour $Pr(B_3/C_0)$ is higher for the monitorable tasks. This indicates that there is

[24]In these tasks, piece-rate contracts are gaining popularity in recent years which, by the very nature of the contract, minimises the need for the employer's supervision.

generally a higher demand for labour in the monitorable tasks so that in addition to regular labourers hired in the beginning of the production cycle, some casual labourers are hired. In other words, while it is more likely that only casual labourers are employed to perform monitorable tasks in the larger farms in all the study villages, it is not necessarily true that only regular labourers are hired to perform the non-monitorable tasks. Among the study villages it is only in Aurepalle that $Pr(B_1/C_1)$ is greater than $Pr(B_2/C_1)$ and $Pr(B_3/C_1)$.

Secondly, the *average use of regular-labour and casual-labour hours* as a proportion of total labour-hours is calculated in these three cases (farms hiring regular labour only, farms hiring casual labour only, and the farms hiring both casual and regular labour) for monitorable and non-monitorable tasks as shown in table 4.2.1'. We focus on farms using both casual and regular labour-hours which is more interesting. The average use of regular labour-hours is relatively higher than that of casual labour-hours in the non-monitorable tasks. The scenario gets reversed when we consider the monitorable tasks. There is an inter-village variation, too. Though the average use of regular labour-hours is relatively less in Shirapur, use of regular labour-hours in non-monitorable tasks is higher in Shirapur compared to that in Aurepalle and Kanzara.

Thirdly, we consider the use of casual-labour and regular-labour hours as a proportion of total labour-hours undertaking the non-monitorable and monitorable tasks *among the farms hiring regular labour* as shown in table 4.2.1"[25]. The conclusion of table 4.2.1' still remains valid so far as the farms hiring both casual-labour and regular-labour hours are concerned. It further reveals whether the allocation of casual-labour and regular-labour hours is different between tasks in these farms compared to our previous classification (table 4.2.1'). It follows that these farms (who hire regular labour) in Aurepalle and Shirapur use a greater proportion of regular labour-hours in the non-monitorable tasks compared to the monitorable ones. In Kanzara, however, the same does not hold good where the relative use of casual labour-hours is higher in both monitorable and non-monitorable tasks. However, in all three study villages, relative use of casual labour-hours is significantly higher in the monitorable tasks than that in non-monitorable tasks.

Finally, we compare the use of casual-labour and regular-labour hours among all farms (shown in table 4.1) and that among large farms only (shown in table 4.2.1) which,

[25]The distinction between the third column of table 4.2.1' and table 4.2.1" is that the entries in table 4.2.1" includes the farms that use only regular labour-hours and both casual-labour and regular-labour hours in the respective tasks. Also note that use of casual-labour and regular-labour hours are the same in the monitorable tasks in tables 4.2.1' and 4.2.1" since farms in none of the villages use only regular labour in the monitorable tasks when all farms are considered (table 4.2.1').

to some extent, accounts for the effect of farm size on the use of regular labour-hours in respective task types. In the *non-monitorable tasks*, the propensity to use only regular labour-hours increases and that of using only casual labour-hours decreases as we switch from all farms to larger farms only. Consequently, the proportion of farms hiring both casual-labour and regular-labour hours in the non-monitorable tasks goes up when the sub-sample of larger farms is considered as compared to the pooled sample.

5.4.2.2. Distribution of Casual-Labour and Regular-Labour Hours in the Production of Paddy and Cotton

As already discussed in section 5.2 of the chapter, irrigation is found to play a crucial role in the demand for regular labourers. It is argued that irrigated crops absorb more regular labour-hours in the study villages because irrigation generates labour demand throughout the process of production and thereby minimises the hoarding costs of employing regular labour. It has been observed that compared to other crops, cultivation of paddy (traditional as well as the HYV) in Aurepalle and that of cotton in Kanzara absorb relatively more regular labour (Walker and Ryan, 1990). Hence, this subsection considers the allocation of casual-labour and regular-labour hours in these crops. The analysis is based on the conditional probability estimates (i.e., propensity) of hiring casual and regular labour for the monitorable and non-monitorable tasks as shown in table 4.2.2.

First, we consider the *production of paddy* in Aurepalle. In our sample, regular labour is hired by large farms only. The proportion of farms using only regular labour is 16% in the non-monitorable tasks where there is no farm which uses only regular labour-hours in the monitorable tasks. However, the proportion of large farms hiring only casual labour is equal (20%) in both monitorable and non-monitorable tasks. Finally, the proportion of farms using both casual-labour and regular-labour hours is higher in the monitorable tasks (80%) compared to the non-monitorable ones (60%).

In the *production of cotton* in Kanzara too both small and large farms participate in production though regular labourers are hired by the large farms only. Hence, the farms hiring only casual labour may be small or large in size while the farms hiring regular labour are all large farms. We also note that there are no farms in our sample which use only regular labour-hours in monitorable or non-monitorable tasks. With this qualification in mind, we consider the use of casual-labour and regular-labour hours in the production of cotton in Kanzara. The proportion of farms using only casual labour-hours is higher in the monitorable tasks (73%) than that (69%) in the non-monitorable ones. Finally, the proportion of farms using both casual-labour and regular-labour hours is equal (24%) between these two types of tasks, though much lower than the proportion of farms using only casual labour-hours in any task type.

Secondly, the *average use of casual-labour and regular-labour hours* relative to total labour-hours in the production of paddy and cotton is calculated as shown in table 4.2.2'. *Here we focus only on farms hiring both casual and regular labourers* (who are all large farms in the production of paddy and cotton). It can be seen from the table that the average use of regular labour-hours is much higher in the non-monitorable tasks compared to that used in the monitorable tasks while the average use of casual labour-hours is higher in the monitorable tasks in the production of both paddy and cotton.

Thus, the cropwise distribution of casual-labour and regular-labour hours suggests that the probability of employing regular labour is higher in the non-monitorable tasks in the production of paddy, but not necessarily so in the production of cotton though the average use of regular labour is higher in non-monitorable tasks than that in monitorable ones.

5.4.3. Types of Tasks and Types of Contracts

In this section, we formally examine the relationship between types of contracts and types of tasks. First, in section 5.4.3.1. we use some chi-square tests of independence to examine this relationship. However, in view of the inadequacy of these chi-square statistics, we perform a multiple regression analysis in section 5.4.3.2.

5.4.3.1. Some Chi-Square Test Statistics

First, Pearson's chi-square and likelihood ratio (LR) chi-square statistics are computed to test the statistical significance of the association between type of tasks (TASK) and that of contracts (PL) in the study villages. We compute these chi-square statistics (i) for all crops and all farms, (ii) for all farms in the production of paddy in Aurepalle and cotton in Kanzara. These statistics are shown in tables 4.3.1 and 4.3.1'.

The degree of freedom of these chi-square statistics is 1. Critical value of chi-square with one degree of freedom is 6.63 at the 1% level of significance while it is 3.84 at the 5% level of significance. When all crops are considered together, none of the chi-square statistics are found to be significant; hence, we cannot infer that there is a significant relationship between the type of task and that of the contract. However, when we consider specific crops (paddy or cotton), the relationship between the two becomes significant.

In the production of paddy and cotton, however, chi-square statistics are significant, though not so in the production of all crops pooled together. This means, task characteristics alone are not important to determine the nature of contracts. We need to consider both farm size and crop character to test the task-based segmentation of labour contracts.

Chi-square statistics infers whether there is a significant relationship or not; it does not, however, infer the direction of this relationship, i.e., whether this relationship is negative or positive. Secondly, chi-square statistics are based on bivariate relationship and, therefore, cannot take account of the effect of farm size or other variables on the choice of contract. Thirdly, while considering the type of contract, chi-square statistics use the contract dummy PL and not the actual use of regular labour-hours. Consequently, some available information is not used in this analysis which may alter the final outcome. Similarly, while controlling for farm size, we distinguish between small and large farms only instead of considering the continuous farm size variable accessible to us which, too, may be somewhat misleading.

5.4.3.2. Tobit and Truncated Models

In order to redress the above shortcomings of chi-square tests performed here, we incorporate a multiple regression framework where the number of regular labour-hours hired is assumed to be determined by the nature of tasks (TASK), farm size (LNCULT), size of irrigated area (LNIRR) and the amount of family labour-hours used in family farming (LNSFLHR).

Two sets of regressions are done here. First, *we include all the farms in the sample.* Using a tobit model, (i) we regress LNSPLHR on TASK, LNCULT, LNIRR and LNSFLHR for all farms and for all crops. We run tobit regression for all villages together with two village dummies AUREPALLE AND KANZARA; we also run the regression for Aurepalle and Kanzara individually. (ii) We regress LNSPLHR on TASK, LNCULT, LNIRR and LNSFLHR in the production of paddy in Aurepalle and cotton in Kanzara. Secondly, *we select the farms hiring regular labourers* and using a truncated regression model (see section 5.2.3.1) repeat the same exercise as in (i) and (ii). Tobit estimates are shown in tables 4.3.2, 4.3.2.a, 4.3.2.b (heteroscedasticity corrected tobit estimates) while truncated estimates in tables 4.3.2' and 4.3.2'.a.

5.4.3.3. Tobit and Truncated Estimates

First we consider the tobit estimates of the demand for regular labour-hours in the production of all crops where all sample farms are included. Dependent variable of the regression is LNSPLHR. Significant variables are LNCULT and LNIRR both of which enhance the demand for regular labour-hours. Coefficients of the task dummy TASK (which takes a value one if labour is hired for non-monitorable tasks (see section 5.1)) and family labour-hours (LNSFLHR) are negative, but they are not significant. This means, task does not exert a significant impact on the demand for regular labour-hours. When we consider all villages together, village dummies are highly significant. We also correct these tobit estimates for the presence of heteroscedasticity in the continuous variables (table 4.3.2.b). The likelihood ratio statistic is not significant for Kanzara, though it is significant for Aurepalle and for all the study villages taken together. In the latter two cases, we, therefore, accept the corrected estimates. This, however, does not alter our main inferences. Task characteristics remain insignificant as before.

Secondly, we consider the truncated regression estimates *for the farms hiring regular labourers* (table 4.3.2'). In this case, too, the task dummy is negative, but insignificant. This means that Eswaran and Kotwal's argument that regular contracts are allocated to non-monitorable tasks does not hold good in the study villages, even if we consider the farms hiring regular labourers. On the contrary, the result indirectly lends support to the 'hoarding cost' argument of chapter two. Regular labourers are not hired to perform non-monitorable tasks only. They are used in monitorable tasks as well such that farms' 'hoarding costs' are kept to the minimum.

Finally, we consider these tobit and truncated regression coefficients in the production of paddy in Aurepalle and cotton in Kanzara. As before, farm size and irrigation facilities are statistically significant, but task dummy is not.

Contrary to what is suggested by the chi-square tests, we find that the task dummy is insignificant in this multiple regression framework; this is true irrespective of whether we consider the specific crop variety like paddy or cotton. In other words, the task dummy is neither significant in the production of all crops nor in the production of paddy or cotton in the multiple regression framework. This holds good irrespective of the sample selection (i.e., whether we consider pooled sample or only the farms hiring regular labourers). However, the size of farm and that of the area irrigated are positive and statistically significant in the determination of the demand for regular labour among the sample farms. In other words, in the light of the information available from the study villages, hypothesis H4 suggesting task-based segmentation of rural labour contracts cannot be accepted.

5.4.3.4. An Overview

It follows from our analysis that considerations of supervision and monitoring in the non-monitorable tasks are not significant in the allocation of labour contracts in the study villages, even among the farms hiring regular labourers. Once regular labourers are hired, they are used indiscriminately in non-monitorable and monitorable tasks such that hoarding costs are kept to the minimum. However, on an average, there is a greater use of regular labour-hours in the non-monitorable tasks than that in monitorable tasks. Secondly, relative use of regular labour-hours is higher in Aurepalle compared to Shirapur and Kanzara. This is because Aurepalle suffers from a more stringent credit and employment constraints than those prevailing in Shirapur and Kanzara (also see discussions in chapters four and seven).

The size of farm and the nature of the crop produced have significant effects on the employment of regular farm servants in these villages. The latter is closely related to the irrigation requirements of the crop. Crops that absorb more regular labour-hours are the crops with higher irrigation requirements. This suggests that farms with irrigation facilities (who are usually the larger farms in the study villages) cultivate the irrigated crops. These large farms, therefore, have steady demand for labour-hours throughout the year and they are the major demanders of regular labourers.

To summarise, our results do not lend support to hypothesis H4 derived from the shirking models; instead, it strengthens the validity of implicit contract argument put forward in chapter two. This can further be supported by the following empirical evidence obtained from the study villages : (a) daily wages of regular farm servants are usually lower than those of casual labourers (see chapter four) and (b) labourers join regular farm contracts only when they have pressing credit needs which is otherwise difficult (due to the scarcity of collateral) to obtain in a segmented rural credit market (see chapter four).

Conclusion

Bardhan (1984a) has argued that farms maintain a pool of regular labourers in order to minimise the 'wage fluctuations' (over the slack and peak periods of agricultural production) and 'recruitment costs' of hiring labour. Eswaran and Kotwal (1985a) have argued that regular farm servants are hired to perform the tasks difficult to supervise with a view to minimise the costs of supervision.

We argue that there is a 'hoarding cost' of paying regular labour in the slack period when their productivity is low. We find that primarily larger farms hire regular farm servants in the study villages because their hoarding costs are lower. In addition to farm size, access to irrigation facilities, the ownership of farm equipments and livestock among larger farms significantly enhance the use of regular labour. Our evidence lends support to the implicit contract argument of chapter two that risk-neutral farms hire risk-averse regular labourers, taking into account the 'hoarding costs' of regular labour in seasonal agriculture. It does not contradict Bardhan (1984a); it rather extends his arguments.

However, the available evidence from the study villages does not significantly support the task-based segmentation of rural labour contracts first advocated by Eswaran and Kotwal (1985a). Casual contracts dominate not only in the monitorable tasks, but also in the non-monitorable tasks. However, the average use of regular labour is relatively higher in the non-monitorable tasks in Aurepalle and Kanzara, though negligible in Shirapur. These findings weaken the plausibility of the shirking model in the traditional village labour markets in India and further strengthens the validity of the proposed implicit contract argument. Once hired, regular labourers are used indiscriminately in all types of agricultural tasks.

Nonetheless, we cannot ignore the fact that there is a general consideration for farms to ensure no-shirking *in any types of tasks* where regular labour is used. Wage advance (i.e., credit) facilities offered to regular labourers can ensure a certain level of discipline for workers with minimum supervision. This is because any regular labourer caught shirking is fired and, therefore, loses the access to credit offered by the employer which is otherwise difficult to obtain.

CHAPTER 5 : TABLES

TABLE 2. Conditional Probability of Employing A Regular Labour

Village	Large Farms	Small Farms
Aurepalle	0.47	0.13
Shirapur	0.07	0.06
Kanzara	0.27	0.00
All Villages	0.26	0.07

TABLE 2'. Farm Size and Types of Contracts : Some Chi-Square Test Statistics

Test Statistic	Aurepalle	Shirapur	Kanzara	All Villages
Pearson's chi-square	24.77 (1) [1]	0.50 (1)	17.71 (1)	31.82 (1)
LR (chi-square)	26.66 (1)	0.50 (1)	26.05 (1)	35.62 (1)
Pearson's R	0.41 (5.42) [2]	-0.06 (0.71)	0.35 (4.46)	0.27 (5.85)

Note: [1] The numbers in parentheses denotes the degree of freedom.
[2] The numbers in parentheses denotes t-ratio.

TABLE 2.1.3. Determinants of the Choice of Contract :
Mean and Standard Deviation of the Explanatory Variables, All Villages, 1980-84

Variables	All Villages		Aurepalle		Kanzara	
	Mean	S.D.	Mean	S.D.	Mean	S.D
LNIRR	0.22	0.65	0.28	0.63	0.30	0.69
LNSFLHR	5.98	1.18	5.60	1.17	6.27	1.15
LNPLOTVA	1.69	0.55	1.65	0.44	1.38	0.46
LNFEQVAL	4.49	1.82	4.65	2.00	4.65	1.70
OBUL	0.57	0.49	0.54	0.50	0.62	0.49
TYPE	0.58	0.49	*	*	*	*
LNCULT	1.80	1.10	1.66	0.94	1.98	1.09
AUREPALLE	0.35	0.48	*	*	*	*
KANZARA	0.35	0.48	*	*	*	*
YEAR80	0.21	0.41	0.20	0.40	0.21	0.41
YEAR81	0.20	0.40	0.22	0.41	0.19	0.39
YEAR82	0.20	0.40	0.20	0.40	0.20	0.40
YEAR83	0.19	0.39	0.19	0.39	0.20	0.40
No. of Observations	422	422	148	148	146	146

Model Specification :

$\underline{X}$ = *(LNIRR, LNSFLHR, LNPLOTVA, LNFEQVAL, OBUL, TYPE, AUREPALLE, KANZARA, YEAR80, YEAR81, YEAR82, YEAR83)*
$\underline{X'}$ = *(LNIRR, LNSFLHR, LNPLOTVA, LNFEQVAL, OBUL, LNCULT, AUREPALLE, KANZARA, YEAR80, YEAR81, YEAR82, YEAR83)*

TABLE 2.2.1. Probit Estimates I of the Choice of Regular Contract, All Villages

Dependent Variable : PL = 1 if the i-th farm offers regular contracts

Variables	Coefficients (T-Ratio) Using Specification X	Marginal Effects (T-Ratio) Using Specification X
ONE	-4.31 (5.286)**	-0.77 (5.249)**
LNIRR	0.52 (3.479)**	0.09 (3.186)**
LNSFLHR	0.06 (0.683)	0.01 (0.681)
LNPLOTVA	0.38 (1.330)	0.07 (1.321)
LNFEQVAL	0.22 (3.177)**	0.04 (3.113)**
OBUL	-0.02 (0.097)	-0.004 (0.097)
TYPE	0.23 (0.995)	0.04 (0.996)
AUREPALLE	1.43 (5.062)**	0.25 (5.030)**
KANZARA	0.76 (2.265)*	0.13 (2.274)*
YEAR80	0.53 (1.735)	0.09 (1.742)
YEAR81	-0.10 (0.318)	-0.02 (0.318)
YEAR82	-0.06 (0.189)	-0.01 (0.189)
YEAR83	-0.06 (0.212)	-0.01 (0.212)
$\hat{L}$	-125.2055	*
LR (χ^2_{12})	156.5176	*
Correct Prediction	325+45=370	*
No. of Observations	422	422

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 2.2.1'. Probit Estimates II of the Choice of Regular Contract, All Villages

Dependent Variable: PL = 1 if the i-th farm offers regular contracts

Variable	Coefficient (T-Ratio) Using Specification X'	Marginal Effects (T-Ratio) Using Specification X'
ONE	-3.84 (4.331)**	-0.46 (3.698)**
LNIRR	0.31 (1.829)	0.04 (1.678)
LNSFLHR	-0.21 (2.016)*	-0.03 (2.001)*
LNPLOTVA	0.23 (0.711)	0.03 (0.699)
LNFEQVAL	0.17 (2.273)*	0.02 (2.132)*
OBUL	-0.87 (2.693)*	-0.10 (2.433)*
LNCULT	1.09 (6.125)*	0.13 (5.232)**
AUREPALLE	1.91 (5.683)**	0.23 (4.853)*
KANZARA	0.82 (2.206)*	0.09 (2.116)*
YEAR80	0.14 (0.389)	0.02 (0.388)
YEAR81	-0.27 (0.753)	-0.03 (0.753)
YEAR82	-0.25 (0.733)	-0.02 (0.733)
YEAR83	-0.08 (-0.259)	-0.01 (0.259)
$\hat{L}$	-101.8334	*
LR (χ^2_{12})	203.2619	*
Correct Prediction	331+55=386	*
No. of Observations	422	422

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 2.2.1'.a. Probit Estimates II of the Choice of Regular Contract, Aurepalle and Kanzara

Dependent Variable: PL = 1 if the i-th farm offers regular contracts

Variable	*Aurepalle* Probit Coefficients (T-Ratio) Using Specification X'	*Kanzara* Probit Coefficients (T-Ratio) Using Specification X'
ONE	-9.99 (0.226)	-7.74 (0.150)
LNIRR	0.11 (0.265)	-0.39 (0.587)
LNSFLHR	-0.53 (1.967)*	-1.09 (2.061)*
LNPLOTVA	0.69 (0.732)	0.04 (0.038)
LNFEQVAL	0.39 (1.936)*	0.76 (2.249)*
OBUL	4.63 (0.105)	7.52 (0.146)
LNCULT	1.86 (4.159)**	1.55 (2.560)*
YEAR80	8.43 (0.191)	-9.88 (0.130)
YEAR81	0.23 (0.287)	-1.11 (1.142)
YEAR82	0.24 (0.310)	-0.84 (0.925)
YEAR83	0.19 (0.288)	-0.63 (0.833)
$\hat{L}$	-26.82188	-14.28185
LR (χ^2_{10})	134.2989	105.1243
Correct Prediction	93 + 41 = 134	119 + 21 = 140
No. of Observations	148	146

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%. A likelihood ratio test of heteroscedasticity (caused by the continuous regressors) suggests that the assumption of homoscedasticity cannot be rejected for both Aurepalle and Kanzara. Hence, we present the original (i.e., uncorrected) estimates only.*

TABLE 2.2.1". Probit Estimates of the Choice of Contract, Corrected for Heteroscedasticity, All Villages

Dependent Variable : PL = 1 if the i-th farm offers regular contracts

Variables	Coefficients (T-Ratio) Using Specification X	Coefficients (T-Ratio) Using Specification X'
ONE	-286.17 (0.676)	-262.95 (0.395)
LNIRR	82.575 (0.646)	34.56 (0.423)
LNSFLHR	8.12 (0.597)	-5.26 (0.406)
LNPLOTVA	-21.31 (0.398)	-42.81 (0.414)
LNFEQVAL	7.35 (0.627)	13.56 (0.412)
OBUL	2.35 (0.116)	4.64 (0.347)
TYPE	4.99 (0.217)	*
LNCULT	*	15.06 (0.429)
AUREPALLE	191.26 (0.640)	235.79 (0.393)
KANZARA	130.91 (0.598)	189.05 (0.379)
YEAR80	57.35 (0.666)	50.94 (0.420)
YEAR81	-0.03 (0.001)	-34.47 (0.394)
YEAR82	-8.90 (0.215)	-33.09 (0.379)
YEAR83	0.04 (0.001)	18.84 (0.357)
LNCULT	*	2.10 (2.643)*
LNIRR	-0.09 (0.277)	-0.59 (1.090)
LNSFLHR	0.09 (0.675)	-0.57 (1.826)
LNPLOTVA	1.44 (3.625)**	0.78 (1.298)
LNFEQVAL	0.26 (2.124)*	0.30 (1.348)
$\hat{L}$	-114.4186	-91.4430
LR (χ^2_{16})	178.0913	224.0426
Correct Prediction	325+58= 383	326+53= 379
No. of Observations	422	422

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

Variables causing heteroscedasticity :

Z = (LNIRR, LNSFLHR, LNPLOTVA, LNFEQVAL)
Z' = (LNCULT, LNIRR, LNSFLHR, LNPLOTVA, LNFEQVAL)

TABLE 2.2.2. Tobit Estimates of the Demand for Regular Labour-Hours, All Villages

Dependent variable : LNSPLHR = Natural logarithm of the number of regular labour-hours used on a farm

Variables	Coefficients (T-Ratio) Using Specification X'	Marginal Effects (T-Ratio)
ONE	-16.26 (4.416)**	-1.31 (3.699)**
LNIRR	1.28 (2.076)*	0.10 (1.837)
LNSFLHR	-1.06 (2.694)*	-0.09 (2.497)*
LNPLOTVA	0.67 (0.534)	0.05 (0.525)
LNFEQVAL	0.77 (2.783)*	0.06 (2.507)*
OBUL	-3.64 (2.901)*	-0.29 (2.494)*
LNCULT	5.33 (7.461)**	0.43 (5.091)**
AUREPALLE	8.39 (6.069)**	0.68 (4.654)**
KANZARA	3.75 (2.449)*	0.30 (2.278)*
YEAR80	0.27 (0.194)	0.02 (0.194)
YEAR81	-1.21 (0.901)	-0.09 (0.899)
YEAR82	-1.28 (0.986)	-0.10 (0.981)
YEAR83	-0.45 (0.364)	-0.04 (0.363)
σ^2	4.63 (10.853)**	*
$\hat{L}$	-300.1706	*
Wald Statistic	*	42.8783
No of Observations	422	422

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 2.2.2.a. Tobit Estimates of the Demand for Regular Labours, Aurepalle and Kanzara

Dependent Variable: LNSPLHR = Natural logarithm of the number of regular labour-hours used on a farm

Variable	*Aurepalle* Tobit Coefficients (T-Ratio) Using Specification X'	*Kanzara* Tobit Coefficients (T-Ratio) Using Specification X'
ONE	-12.296 (2.597)*	-18.96 (0.253)
LNIRR	0.94 (1.312)	-0.55 (0.789)
LNSFLHR	-1.40 (3.744)**	-1.93 (3.342)**
LNPLOTVA	0.72 (0.442)	-0.54 (0.317)
LNFEQVAL	0.77 (3.220)**	1.75 (3.284)**
OBUL	4.83 (1.729)	15.58 (0.208)
LNCULT	4.19 (6.227)**	3.74 (5.275)**
YEAR80	11.87 (3.834)**	-23.66 (0.234)
YEAR81	0.80 (0.568)	-2.88 (1.854)
YEAR82	0.35 (0.253)	-2.79 (1.885)
YEAR83	0.83 (0.694)	-1.06 (0.900)
σ^2	2.77 (8.953)**	2.53 (6.481)**
$\hat{L}$	-142.6644	-70.44494
No. of Observations	148	146

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

A likelihood ratio test of heteroscedasticity (caused by the continuous regressors) suggest that the assumption of homoscedasticity cannot be rejected for both Aurepalle and Kanzara. Hence, we present the original estimates only.

TABLE 2.2.2'. Tobit Estimates of Demand for Regular Labours, Corrected for Heteroscedasticity, All Villages

Dependent variable : LNSPLHR = Natural logarithm of the number of regular labour-hours used on a farm

Variable	Coefficient (T-Ratio) Using Specification X'
ONE	-14.23 (2.584)*
LNIRR	2.51 (3.185)**
LNSFLHR	-0.78 (1.586)
LNPLOTVA	-1.10 (0.749)
LNFEQVAL	1.13 (2.196)*
OBUL	-3.96 (1.988)*
LNCULT	3.83 (4.108)**
AUREPALLE	8.65 (4.095)**
KANZARA	4.27 (2.208)*
YEAR80	0.82 (0.524)
YEAR81	-1.47 (1.027)
YEAR82	-1.89 (1.307)
YEAR83	-0.51 (0.405)
LNCULT	0.34 (2.242)*
LNIRR	-0.34 (2.249)*
LNSFLHR	-0.15 (1.942)*
LNPLOTVA	0.03 (0.129)
LNFEQVAL	-0.03 (0.548)
σ^2	6.72 (1.365)
$\hat{L}$	-294.0393
No. of Observations	422

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 2.3.2. Hoarding Costs : Truncated Estimates of the Demand for Regular Labour-Hours by the Farms Hiring Regular Labour, All Villages

Dependent variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variable	OLS Estimate	Truncated Regression Estimates
ONE	2.88 (1.753)	2.88 (1.918)*
LNIRR	0.27 (1.787)	0.27 (1.955)*
LNSFLHR	-0.45 (3.761)**	-0.45 (4.114)**
LNPLOTVA	-0.15 (0.362)	-0.15 (0.0398)
LNFEQVAL	0.09 (1.198)	0.09 (1.310)
OBUL	0.12 (0.122)	0.12 (0.134)
LNCULT	1.81 (9.335)**	1.81 (10.198)**
AUREPALLE	0.73 (1.453)	0.73 (1.590)
KANZARA	-0.09 (0.146)	-0.09 (0.161)
YEAR80	0.76 (0.720)	0.76 (0.787)
YEAR81	-0.11 (0.273)	-0.11 (0.299)
YEAR82	-0.47 (1.317)	-0.47 (1.441)
YEAR83	0.20 (0.604)	0.20 (0.660)
σ^2	*	0.82 (12.561)**
$\hat{L}$	-96.1849	-96.18234
No. of Observations	79	79

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 2.3.2'. Hoarding Costs : Truncated Estimates of the Demand for Regular Labour-Hours by the Farms Hiring *Only One* Regular Labour, All Villages

Dependent variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variable	OLS Estimate	Truncated Regression Estimates
ONE	1.18 (0.394)	1.16 (0.479)
LNIRR	0.12 (0.364)	0.12 (0.444)
LNSFLHR	-0.39 (1.328)	-0.39 (1.642)
LNPLOTVA	0.10 (0.136)	0.09 (0.160)
LNFEQVAL	0.13 (1.009)	0.13 (1.243)
OBUL	0.50 (0.406)	0.50 (0.503)
LNCULT	2.00 (5.954)**	2.01 (7.298)**
AUREPALLE	-0.73 (0.372)	-0.73 (0.459)
KANZARA	-0.30 (0.278)	-0.31 (0.348)
YEAR80	2.68 (1.824)	2.69 (2.243)*
YEAR81	-0.48 (0.620)	-0.48 (0.764)
YEAR82	-1.37 (1.786)	-1.36 (2.199)*
YEAR83	-0.09 (0.372)	-0.09 (0.163)
σ^2	*	0.89 (8.680)*
$\hat{L}$	*	-49.5315
No. of Observations	38	38

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 3.3. Joint Determination of the Choice of Contract and Demand for Regular Labour-Hours : Estimates of Double-Hurdle Model, All Villages

Variables	Double-Hurdle Model Coefficient (T-Ratio)	Tobit Model Coefficient (T-Ratio)
First Hurdle : TYPE	*	*
ONE	-1.316 (1.851)*	*
LNCULT	0.51 (3.446)**	*
LNIRR	0.55 (3.307)**	*
LNSFLHR	-0.32 (2.951)*	*
LNFEQVAL	0.22 (3.357)**	*
No. of Observations	422	
Second Hurdle : LNSPLHR	*	*
ONE	-1.30 (0.7286)	-16.26 (4.416)**
LNIRR	0.27 (1.588)	1.28 (2.076)*
LNSFLHR	-0.46 (3.340)**	-1.06 (2.694)*
LNPLOTVA	-0.15 (0.3125)	0.67 (0.534)
LNFEQVAL	0.18 (2.157)*	0.77 (2.783)*
OBUL	3.28 (3.118)**	-3.64 (2.901)*
LNCULT	2.28 (10.73)**	5.33 (7.461)**
AUREPALLE	0.94 (1.686)	8.39 (6.069)*
KANZARA	-0.20 (0.2918)	3.75 (2.449)*
YEAR80	4.12 (3.654)**	0.27 (0.194)
YEAR81	-0.28 (0.6407)	-1.21 (0.901)
YEAR82	-0.66 (1.665)	-1.28 (0.986)
YEAR83	0.18 (0.4863)	-0.45 (0.364)
σ^2	0.873 (11.68)**	4.63 (10.853)**
No. of Observations	244	422
$\hat{L}$	-159.148465 [1]	-227.574453 [1]

Note : [1] Calculation of the likelihood function does not include the part of the function which is constant. Needless to mention, this does not affect the maximisation exercise. '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 4.1. Conditional Probabilities of Hiring Labour for Different Types of Tasks, All Farms

Type of Tasks	Village	Conditional Probability of Hiring		
		Regular labour only	*Casual labour only*	*Both casual and regular labour*
'*a*'	Aurepalle	0.16	0.33	0.15
	Shirapur	0.02	0.66	0.02
	Kanzara	0	0.77	0.15
'*b*'	Aurepalle	0.05	0.41	0.26
	Shirapur	0.02	0.89	0.02
	Kanzara	0	0.84	0.14
'*c*'	Aurepalle	0	0.51	0.31
	Shirapur	0	0.95	0.03
	Kanzara	0	0.76	0.16

TABLE 4.2.1. Conditional Probabilities of Hiring Labour for *Monitorable* and *Non-Monitorable* Tasks, Large Farms

Nature of Tasks	Village	Conditional Probability of Hiring		
		Regular labour only	*Casual labour only*	*Both casual and regular labour*
Non-Monitorable	Aurepalle	0.27	0.20	0.23
	Shirapur	0.01	0.58	0.01
	Kanzara	0	0.68	0.24
Monitorable	Aurepalle	0	0.46	0.49
	Shirapur	0	0.97	0.03
	Kanzara	0	0.74	0.25

Note : These probabilities are calculated on the basis of labour use by large farms only.

TABLE 4.2.1'. Average Use of Casual-Labour and Regular-Labour Hours in *Monitorable* and *Non-Monitorable* Tasks, Large Farms

Nature of Tasks	Village	Average Use			
		If farm hires regular labour-hours only	*If farm uses casual labour-hours only*	*If farm hires both regular-labour & casual-labour hours*	
				Regular	Casual
Non-Monitorable	Aurepalle	0.66	0.37	0.45	0.34
	Shirapur	0.68	0.39	0.59	0.10
	Kanzara	0.00	0.55	0.30	0.46
Monitorable	Aurepalle	0.00	0.46	0.19	0.58
	Shirapur	0.00	0.53	0.15	0.38
	Kanzara	0.00	0.49	0.14	0.72

Note : These probabilities are calculated on the basis of labour use by large farms only.

TABLE 4.2.1". Average Use of Casual-Labour and Regular-Labour Hours *among Farms Hiring Regular Labour*

Nature of Task	Village	Average Use of	
		Regular Labour-Hours	*Casual Labour-Hour*
Non-Monitorable	**Aurepalle** **Shirapur** **Kanzara**	0.56 0.64 0.30	0.16 0.02 0.46
Monitorable	**Aurepalle** **Shirapur** **Kanzara**	0.19 0.15 0.14	0.58 0.38 0.72

TABLE : 4.2.2. Conditional Probabilities of Labour Hiring : *Paddy* and *Cotton* Production

Crop	Nature of Tasks	Conditional Probability of Hiring		
		Regular labour only	*Casual labour only*	*Both regular & casual labour*
Paddy	*Non-Monitorable* *Monitorable*	0.16 0.00	0.20 0.20	0.60 0.80
Cotton	*Non-Monitorable* *Monitorable*	0.00 0.00	0.67 0.73	0.24 0.24

TABLE 4.2.2'. Average Use of Casual-Labour and Regular-Labour Hours : *Paddy* and *Cotton* Production

Crop	Nature of Tasks	Average Use			
		If farm hires regular labour-hours only	*If farm hires casual labour-hours only*	*If farm hires both regular and casual labour-hours*	
				Regular	**Casual**
Paddy	*Non-Monitorable* *Monitorable*	0.86 0.00	0.16 0.70	0.57 0.16	0.25 0.72
Cotton	*Non-Monitorable* *Monitorable*	0.00 0.00	0.44 0.49	0.28 0.14	0.49 0.73

TABLE 4.3.1. Types of Tasks and Types of Contracts : Some Chi-Square Test Statistics, All Crops

Test Statistics	Aurepalle	Shirapur	Kanzara	All
Pearson(χ^2_1)*[1]*	0.029 (0.00)*[2]*	0.001 (0.00)	0.026 (0.029)	0.057 (0.023)
Likelihood Ratio (χ^2_1) *[1]*	0.029 (0.00)	0.001(0.00)	0.026 (0.29)	0.057 (0.023)

Note : [1] The subscript denotes the degree of freedom of the chi-square test statistic.
[2] Numbers in parentheses denote the relevant chi-square when only large farms are considered.

TABLE 4.3.1'. Types of Tasks and Types of Contracts : Chi-Square Statistics in Paddy and Cotton Production

Test Statistics	Paddy	Cotton
Pearson (χ^2_1) *[1]*	9.10 (5.56) *[2]*	4.74 (1.91)
Likelihood Ratio (χ^2_1) *[1]*	12.19 (7.49)	5.30 (2.04)

Note : [1] The subscript denotes the degree of freedom of the chi-square test statistic.
[2] The numbers in parentheses denote the relevant chi-square when only large farms are considered.

TABLE 4.3.2. Task Characteristics and the Demand for Regular Labour-Hours : *Tobit Estimates*, Aurepalle, Kanzara and All Villages

Dependent Variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variables	Aurepalle	Kanzara	All Villages
ONE	-7.57 (4.226)**	-27.79 (4.771)**	-20.82 (10.088)**
LNCULT	3.41 (6.547)**	3.52 (3.510)**	4.44 (9.342)**
LNIRR	2.09 (4.009)**	3.29 (3.334)**	1.98 (4.447)**
LNSFLHR	-0.18 (0.649)	1.59 (2.000)*	-0.11 (0.492)
TASK	-1.32 (0.782)	2.88 (1.422)	-0.79 (0.709)
AUREPALLE	*	*	9.98 (9.828)**
KANZARA	*	*	4.70 (4.380)**
σ^2	4.00 (11.846)**	4.35 (8.456)**	4.67 (14.852)**
Log-Likelihood	-340.2242	-158.8655	-575.6110
No. of Observations	294	292	842

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 4.3.2.a. Task Characteristics and the Demand for Regular Labour-Hours : *Tobit Estimates*, Paddy and Cotton Production

Dependent Variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variables	Paddy	Cotton
ONE	-9.05 (3.524)**	-21.467 (3.180)**
LNCULT	3.47 (6.041)**	3.67 (2.309)*
LNIRR	2.78 (5.251)**	5.47 (3.811)**
LNSFLHR	-0.08 (0.352)	0.38 (0.767)
TASK	-0.16 (0.232)	0.16 (0.103)
σ^2	2.21 (8.142)**	4.09 (6.031)**
Log-Likelihood	-100.2168	-73.69089
No. of Observations	66	156

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%. A likelihood ratio test of heteroscedasticity (caused by the continuous regressors) suggests that the assumption of homoscedasticity cannot be rejected.*

TABLE 4.3.2.b. Task Characteristics and the Demand for Regular Labour-Hours : *Tobit Estimates* Aurepalle, Kanzara and All Villages, Corrected for Heteroscedasticity

Dependent Variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variables	Aurepalle	Kanzara	All Villages
ONE	-11.23 (5.158)**	-26.85 (2.504)*	-22.79 (6.308)**
LNCULT	3.97 (7.336)**	3.13 (1.831)	4.08 (4.990)**
LNIRR	2.46 (6.530)**	3.21 (1.976)*	3.15 (5.241)**
LNSFLHR	-0.009 (0.047)	1.68 (1.602)	-0.002 (0.008)
TASK	0.008 (0.006)	2.94 (1.227)	-0.22 (0.242)
AUREPALLE	*	*	10.41 (6.166)**
KANZARA	*	*	5.75 (4.430)**
LNCULT	-0.30 (2.076)*	0.13 (0.383)	0.06 (0.913)
LNIRR	-0.63 (4.723)**	-0.04 (0.167)	-0.41 (4.414)**
LNSFLHR	0.02 (0.955)	-0.02 (0.153)	0.005 (0.205)
σ^2	9.45 (2.695)*	3.27 (0.810)	5.33 (5.342)**
Log-Likelihood	-306.9012	-158.6372	-560.2511
No. of Observations	294	292	842

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 4.3.2'. Task Characteristics and the Demand for Regular Labour-Hours : *Truncated Regression* Estimates, Aurepalle, Kanzara and All Villages

Dependent Variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variables	Aurepalle	Kanzara	All Villages
ONE	2.45 (4.660)**	-1.57 (0.806)	1.38 (2.544)*
LNCULT	1.04 (8.472)**	1.74 (5.152)**	1.19 (9.892)**
LNIRR	0.26 (2.127)*	0.64 (2.157)*	0.22 (1.996)*
LNSFLHR	0.02 (0.313)	0.09 (0.326)	-0.03 (0.454)
TASK	-0.17 (0.316)	-0.41 (0.550)	-0.46 (1.480)
AUREPALLE	*	*	1.03 (3.229)**
KANZARA	*	*	0.60 (1.650)
σ^2	0.73 (13.702)**	0.91 (9.487)**	0.84 (17.420)**
Log-Likelihood	-104.3845	-59.66200	-186.0989
No. of Observations	94	45	149

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

TABLE 4.3.2'.a. Task Characteristics and the Demand for Regular Labour-Hours : *Truncated Regression* Estimates, Paddy and Cotton Production

Dependent Variable : LNSPLHR = Natural logarithm of total regular labour-hours used on a farm

Variables	Paddy	Cotton
ONE	2.04 (2.604)*	3.88 (1.577)
LNCULT	1.21 (7.453)**	2.60 (4.653)**
LNIRR	0.63 (3.701)**	1.35 (2.443)*
LNSFLHR	-0.05 (0.988)	-0.20 (1.038)
TASK	0.16 (0.801)	-0.79 (1.585)
σ^2	0.55 (8.832)**	1.04 (6.631)**
Log-Likelihood	-31.71086	-32.27792
No. of Observations	39	22

Note : '' denotes that the variable concerned is significant at 5% while '**' denotes that it is significant at 1%.*

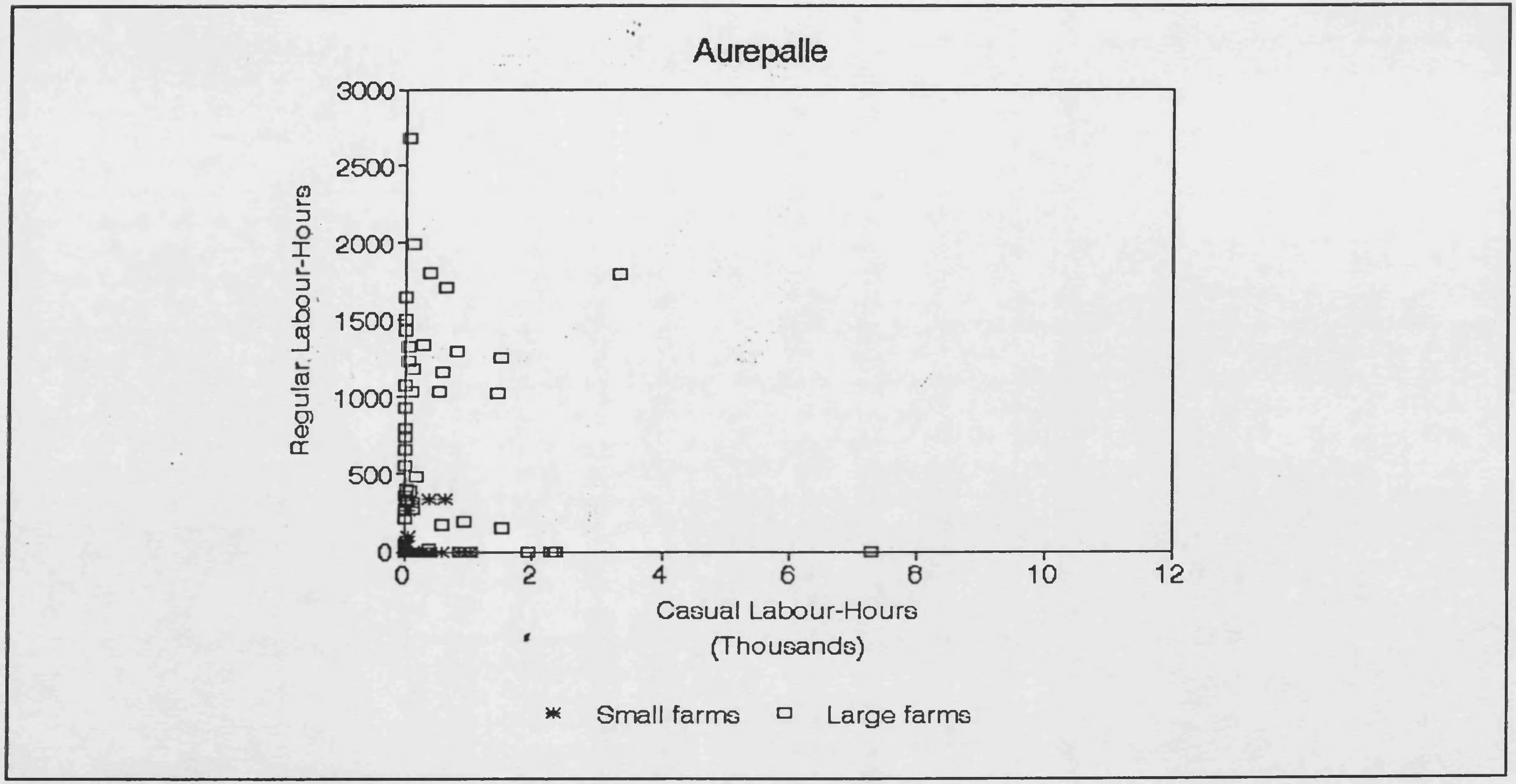

Figure 1. Distribution of casual and regular labour-hour between small and large farms, Aurepalle.

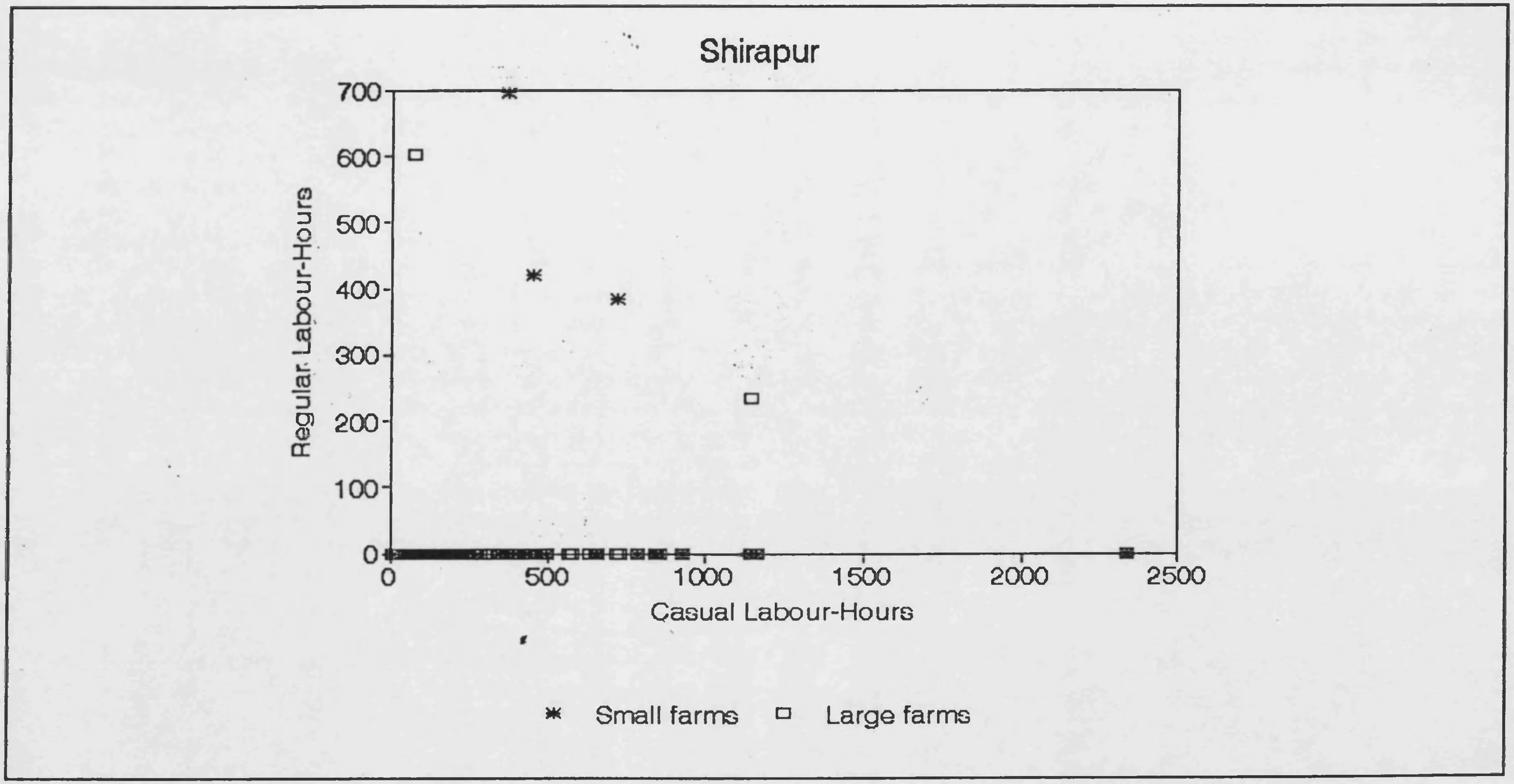

Figure 2. Distribution of casual and regular labour-hour between small and large farms, Shirapur.

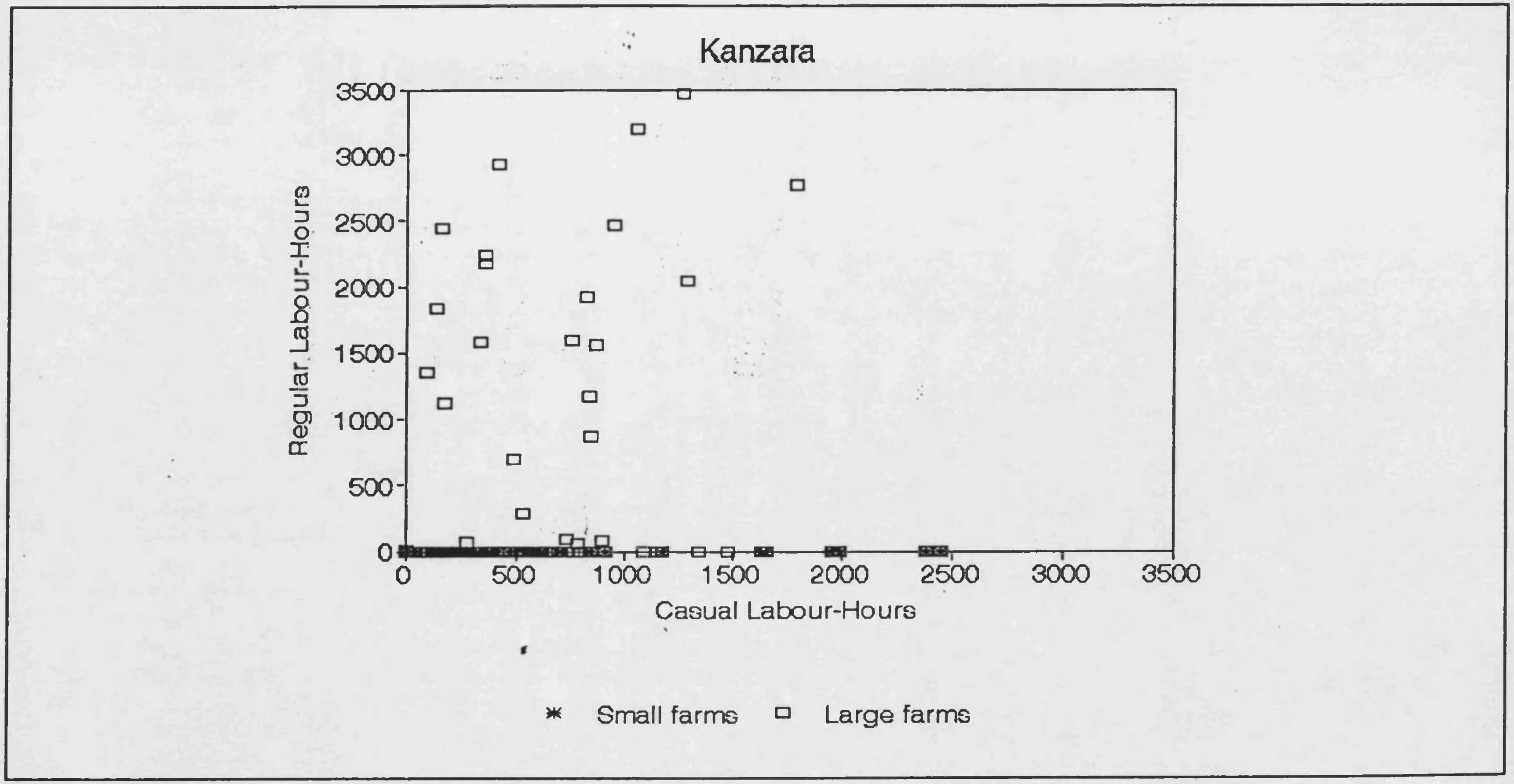

Figure 3. Distribution of casual and regular labour-hour between small and large farms, Kanzara.

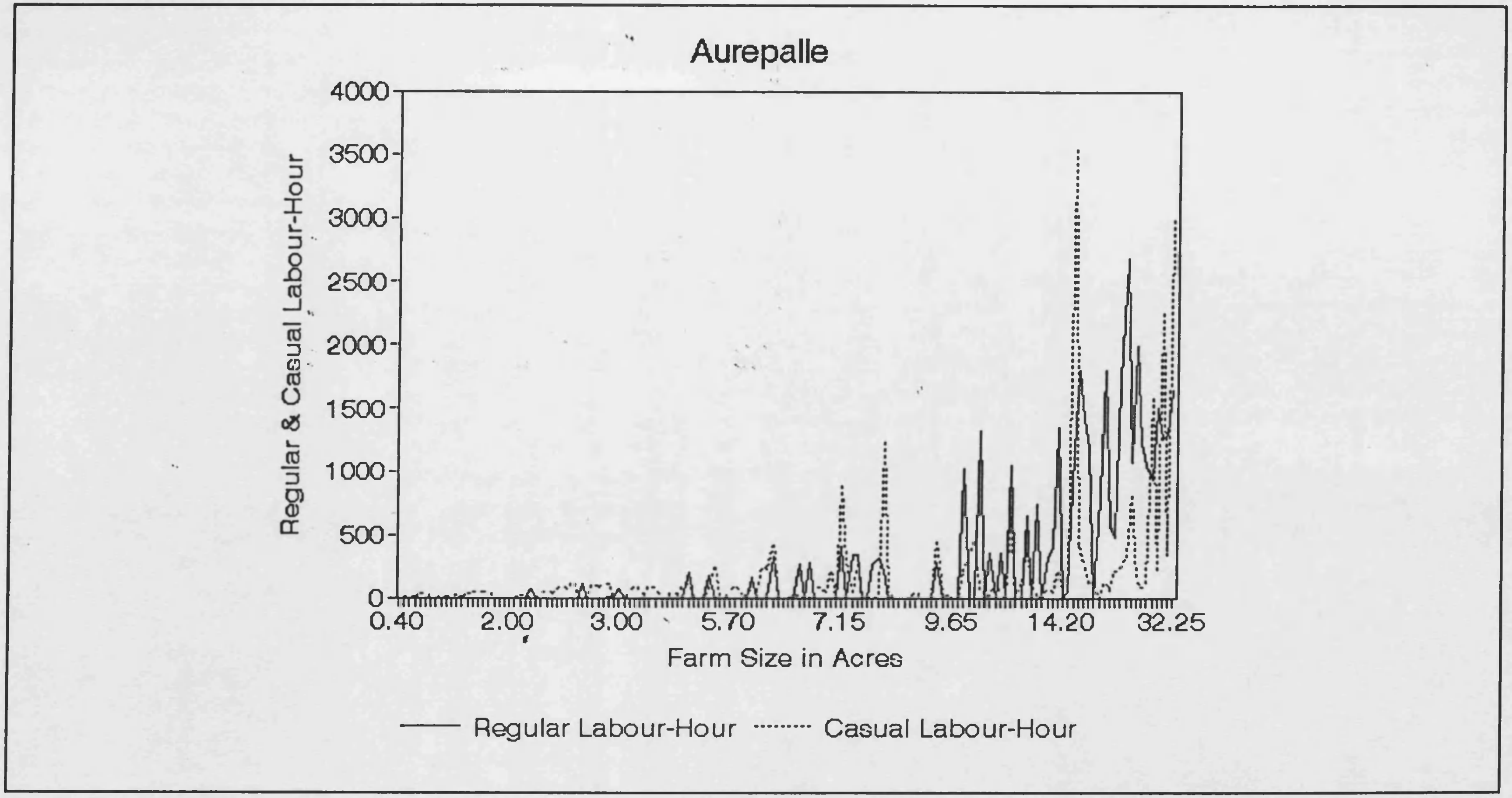

Figure 4. Distribution of casual and regular labour-hour according to the size of landholding (acres), Aurepalle.

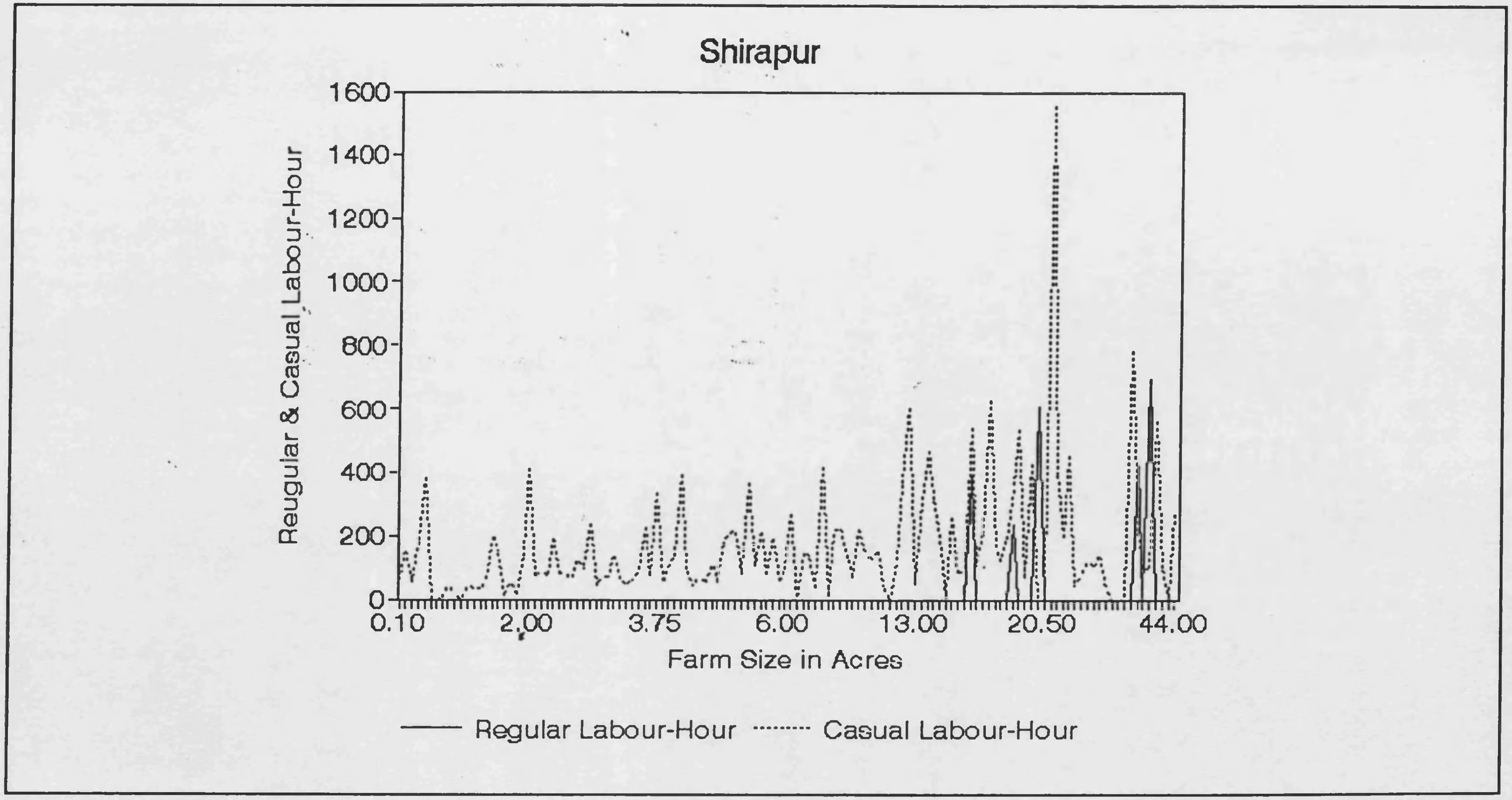

Figure 5. Distribution of casual and regular labour-hour according to the size of landholding (acres), Shirapur.

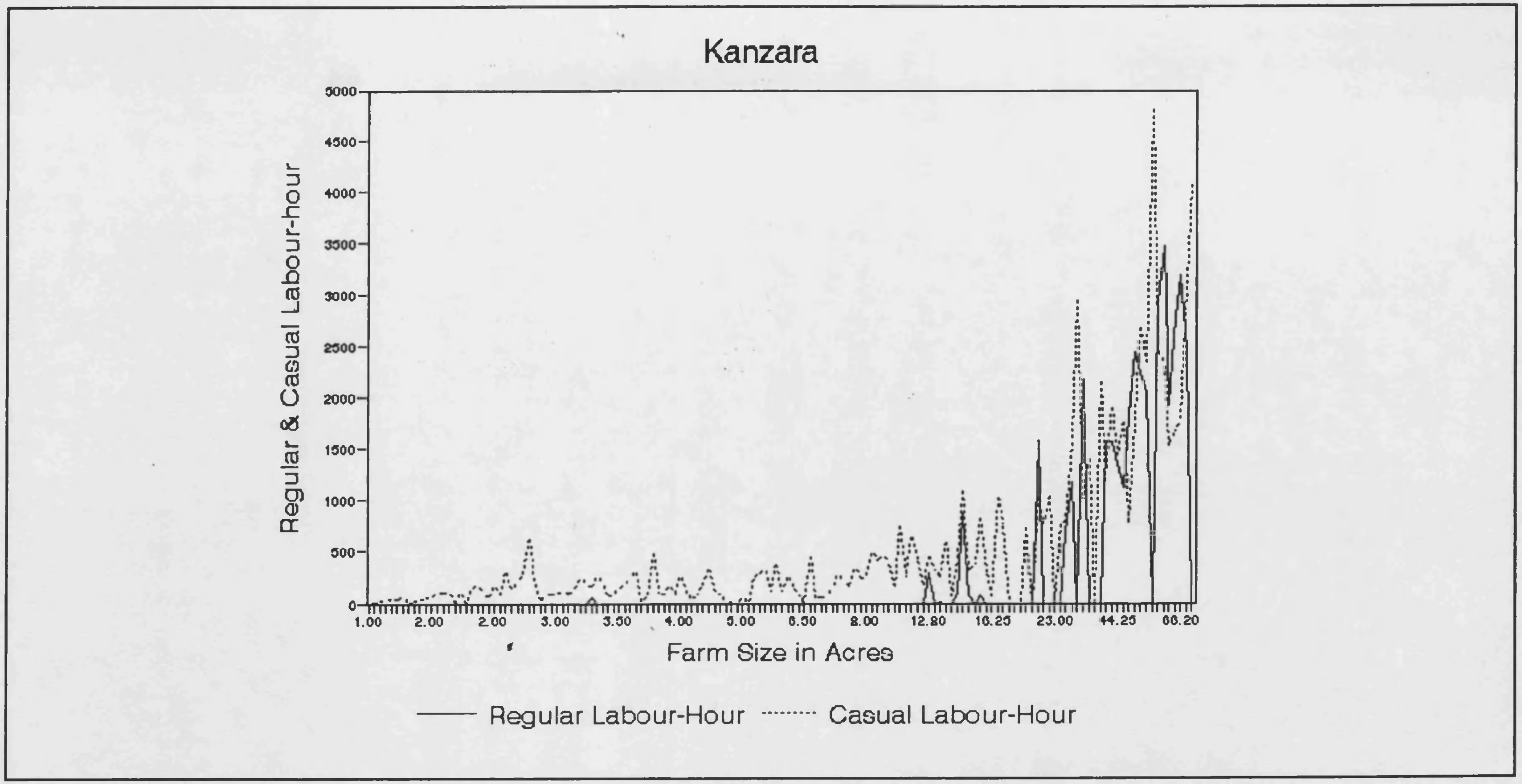

Figure 6. Distribution of casual and regular labour-hour according to the size of landholding (Acres, Kanzara

CHAPTER 6. CASUAL AND REGULAR CONTRACTS : DETERMINANTS OF THE WORKERS' CHOICE OF LABOUR CONTRACTS

Introduction

Most models of the choice of contract in rural labour markets in India (Bardhan, 1983, 1984a; Eswaran & Kotwal, 1985a; Guha, 1989; Dasgupta, 1993a) emphasize the role of demand. However, in the light of our interviews in Aurepalle, two models, namely the Collateral Model and the Time Constraint Model, were developed in chapter 2 formalising the possible role of supply considerations in the choice of contracts in rural India. One of the hypotheses emanating from the analysis is H6 (see the introductory chapter), which states that regular labour contracts are likely to be particularly attractive for landless labourers.

Given the seasonal nature of the agricultural employment, credit plays a central role in smoothing out production and consumption. Land is the most acceptable form of collateral; hence, the availability of credit, especially for consumption purposes, is limited for landless poor. Regular farm contracts with access to advance payment (i.e., credit) thus acts as a convenient instrument to meet the needs of both labourers and employers. Labourers obtain scarce credit while the employers monitor labourers with greater ease[1]. This is a case where credit market imperfection is interlocked with contractual arrangements in the labour market. Secondly, the choice of regular contracts by landless labourers is compatible with their time constraint, in contrast with landed labourers who are usually constrained to devote a good deal of time to family farming. Hence, a landless labourer's choice of a regular contract is advantageous not only in view of the higher marginal cost of credit he faces in the market, but also in view of the lower opportunity cost of time.

In view of hypothesis H6, this chapter focuses on the workers' choice of contract and the nature of their market participation. It has been found in chapter three that the households with larger and better-quality land also own more non-land resources so that the ownership of landholding is some indication of the ownership of other productive resources held by the household. In view of this relationship, the analysis of the workers' choice of contract in this

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[1]Ray and Sengupta (1989) have argued that an interlocker faces better terms of trade as with the case of regular labour contracts. Besides earning interest on the amount lent, a regular employer can ensure the requisite effort level with minimum supervision while a moneylender is only satisfied with earning interest.

chapter, hinges heavily on the family landholding which reflects both the time and credit constraints on the potential workers in the market[2].

This chapter is developed as follows. Section 6.1 describes the data-set while section 6.2 examines the association between family landholding and the worker's choice of contract in the study villages. Section 6.3 and 6.4 focus on the nature of participation in the casual labour market; section 6.3 analyses the factors determining farm and non-farm employment while section 6.4 discusses those determining the duration of unemployment among male and female casual labourers. The chapter ends with a brief summary of our findings.

6.1. Description of Regression Variables

The empirical analysis, in this chapter, is primarily based on the data collected by the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) from three study villages, Aurepalle, Shirapur and Kanzara (see chapter three). However, for the purpose of investigating hypothesis H6, ICRISAT data are found to be lopsided. Firstly, the data on labour use by the sample farms (VLS-Y) do not include information regarding the characteristics of labourers[3]. Hence, we consider the labour market participation data given in the VLS-K schedule where each observation indicates the details of the individual's actual employment situation. However, here too there is a problem; day-to-day market participation data refers to casual labourers only. Regular farm labourers are excluded from here because they are bound to work every day during the stipulated period of the contract, except when they are sick. Information about the regular farm servants are obtained from the VLS-C schedule which includes their personal characteristics like age, sex, education as well as the employment details like the period of contract, hours worked a day, wages in cash and kind, etc.; their family background is, however, left out. Hence, in order to study the worker's choice of contract, I shall make use of my resurvey data collected from Aurepalle in January 1992. However, we shall use the ICRISAT data-set to examine the employment/unemployment situation prevailing in the casual labour market. In this section,

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[2]In view of the seasonality of production and employment, family landholding determines the amount of time available to be sold in the market and thus determines the choice of contract in these household economies. Secondly, given the collateral requirement to obtain credit from the market, family landholding determines the creditworthiness of the labourers. Finally, family often offers support during a spell of unemployment; labourers from the landless households cannot, therefore, fall back upon the family.

[3]For a description of the VLS-Y schedule, see chapter three. The schedule has information only about the type of labour (human or animal, family, regular or casual, male, female or child.

we describe the regression variables obtained from the ICRISAT data-set as well as those obtained from the resurvey data-set.

6.1.1. ICRISAT Data

First, the variables constructed from the original ICRISAT data are considered. Information are gathered primarily from three schedules, namely, VLS-C, VLS-K and VLS-Y1. Personal characteristics of casual labourers are found in the VLS-C schedule which is adjusted to consider each member once each year. If there is a change of status (e.g., if the member left the household or re-entered) after the rabi (second) season, s/he is not included.

With this adjustment, the following family characteristics are defined for male and female labourers residing in the study villages over each agricultural year during the period 1980-84.

TYPE = 1 if i-th labourer belongs to medium/large farms in the ICRISAT classification (VLS-C/VLS-K schedule)
= 0 if the i-th labourer belongs to labour households/small farms in the ICRISAT classification
AGGCULT = family landholding in acres (VLS-Y1 schedule)
LNCULT = natural logarithm of family landholding
NFNG = 1 if the i-th labourer participates in both non-farm and governmental work
= 0 otherwise
CASTE1 = 1 if the i-th labourer belongs to caste group 1
= 0 otherwise (VLS-C schedule)
CASTE2 = 1 if the i-th labourer belongs to caste group 2
= 0 otherwise (VLS-C schedule)
CASTE3 = 1 if the i-th labourer belongs to caste group 3
= 0 otherwise (VLS-C schedule)
CASTE4 = 1 if the i-th labourer belongs to caste group 4
= 0 otherwise (VLS-C schedule).

Besides the family characteristics, a number of variables relating to the personal characteristics have also been constructed from the VLS-C schedule as follows.

AGE = Age of the i-th labourer in years
LNAGE = Natural logarithm of AGE
SQAGE = Square of AGE
LNSQAGE = Natural logarithm of SQAGE
ILLI = 1 if the i-th labourer is illiterate
= 0 otherwise

Finally, the following participation variables are constructed from VLS-K schedule.

FDAY = Number of days worked by the i-th labourer on others' farms in a year
LNFDAY = Natural logarithm of FDAY

FWNFW = 1 if the i-th labourer performs both farm and non-farm employment in a year
= 0 otherwise
UNEMP = Monthly duration of unemployment of the i-th labourer
LNUNEMP = Natural logarithm of UNEMP.

6.1.2. Resurvey Data

The resurvey data used here is collected from one of the study villages, namely, Aurepalle during January 1992. All the regular farm servants in Aurepalle are male. Hence, a sample of 26 male regular labourers and 85 male casual labourers hired by the sample households in Aurepalle is chosen; the choice of sample itself eliminates the sex bias operating in the market.

On the basis of our information, the following variables have been constructed.

AGE = Age of the i-th labourer in years
LNAGE = Natural logarithm of AGE
SQAGE = Square of AGE in years
LNSQAGE = Natural logarithm of SQAGE
ILLI = 1 if the i-th labourer is illiterate
= 0 otherwise[4]
TYPE = 1 if the i-th labourer comes from a medium or large landholding household
= 0 if the i-th labourer comes from a labour household or a small farmers' family
FLHOLD = amount of family landholding of the i-th labourer in acres
LNFLHOLD = natural logarithm of family landholding
IRRORN = 1 if the family land of the i-th labourer is irrigated
= 0 otherwise
MALAGA = 1 if the i-th labourer comes from Mala or Madiga household
= 0 otherwise
GOWDA = 1 if the i-th labourer comes from Gowda household
= 0 otherwise
KURMA = 1 if the i-th labourer comes from Kurma household
= 0 otherwise
OTHERS = 1 if the i-th labourer comes from other caste groups in the village
= 0 otherwise
CASTE4 = 1 if the i-th labourer comes from a household with caste ranking four.
= 0 otherwise[5]
FATHRFS = 1 if the father of the i-th labourer is/was a regular farm servant (RFS)
= 0 otherwise.

[4]In our sample, most of the labourers are found to be illiterate. Hence, we did not consider the level of educational achievement of these labourers. We thus divide them in two categories only, literate and illiterate.

[5]We classify different castes according to the variable JGRCAST (see chapter three).

6.2. Determinants of Workers' Choice of Contract

A majority of regular farm servants in Aurepalle as noted in my resurvey data[6] came from families with marginal/no landholdings[7]. All the regular farm servants in the sample owned land less than or equal to 5 acres and in every case the land owned was dry. Figure 1 depicts the cumulative distribution of family landholdings of casual and regular labourers in Aurepalle where we plot the workers' family landholdings (in acres) on the horizontal axis. A majority of individuals with less than or equal to 5 acres of family landholding choose regular jobs, while all the workers owning more than 5 acres of land choose casual contracts.

The market for regular farm servants in Aurepalle is a strongly caste-bound system where most regular labourers come from the Madiga caste. In our sample, 73% of the regular farm servants belong to the Madiga caste and 11.5% to Mala; the rest are Gowda (the toddy tappers) (see table 2). However, traditionally Mala and Madiga are the two castes who dominate the market for regular farm servants. The Gowdas in the sample joined the regular farm servants' job because they had incurred losses in their traditional business of selling toddy and needed some access to credit[8]. However, castes like Kurma, Gowda, Mala and Madiga are found to dominate the casual labour market (see table 2')[9]. This may reflect the fact that caste is a major controlling factor in the male's access to the regular labour market in Aurepalle[10].

The employment of the father as a regular farm servant may also have an important influence in the son taking a farm-servant's job. In our sample, respondents were asked about the occupation of their father and other family members. In about 65% of the cases, the father of a regular farm servant is found to be a regular farm servant as well, at least for some years, if not throughout their lifetime. In some cases, the son is found to be working with the same employer as his father. This long-standing relationship with the employer may

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[6]One of the reasons for conducting this resurvey of Aurepalle was as follows: ICRISAT data does not include information about the family landholding of regular labourers. This was collected during my resurvey.

[7]The distribution of land is highly unequal in all the study villages. The average operational landholding is 3.53 ha (2.4 acres = 1 ha) in Aurepalle; however, the average size of landholding of the largest farm size category is 7 times higher than the average size of landholding, in general. In Kanzara, more than one-third of the households operate hardly 8% of the area while 6% of the households operate 33% of the total area. The same picture holds for Shirapur where 50% of the cultivating households operate 17% of the total area.

[8]Traditionally Gowdas participate in the casual labour market.

[9]All these castes, namely, Mala, Madiga, Gowda, Kurma belong to JGR caste ranking four (see discussion in chapter three; also see Doherty, 1982).

[10]However, caste factor is not so important in the other two study villages (Walker and Ryan, 1990).

sometimes entail certain extra-economic obligations (Rudra, 1982a). For example, other members of the regular farm servant's family (e.g., wife or children) may also work for the employer's family, though they are not bound to do that. However, in the study villages they are usually found to receive some payments in cash or kind in exchange for these unofficial labour services[11,12].

Some chi-square test statistics[13] of independence are computed to examine the association between the contract variable PL and the family landholding FLHOLD. Values of these statistics are shown in table 2". The computed values of the chi-square test statistics (Pearson's as well as likelihood ratio), are all significant which supports that there is a significant association between the choice of contract (PL) and family landholding of the workers (FLHOLD). Moreover, the Pearson's correlation coefficient between contract variable PL and family landholding is negatively significant suggesting that individuals from landless families choose regular contracts.

In the absence of any obligation to cultivate family landholding, these landless labourers are usually in a position to offer all their non-leisure time in the market. Moreover, in their inability to offer land as collateral, they are usually excluded from the formal credit market which offers cheaper credit as compared to informal agencies. Hence, regular contracts with interest-free credit availability may be an attractive choice for these labourers, especially the landless ones.

Using the resurvey data from Aurepalle, this section examines the following hypothesis: the higher the family landholding of labourers, the lower is the likelihood of choosing a regular farm contract. The analysis is developed as follows. A probit model of contractual choice is described in section 6.2.1. The model is specified in section 6.2.2 while it is estimated in section 6.2.3. Finally, in view of the probit estimates, section 6.2.4 examines the relationship between family landholding and the choice of contract. The section

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[11]It appears that the employer-employee relationship in the regular contract is quite impersonal and is different from the cases of bonded labour as in a feudal society (Bardhan, 1984a; also see chapter seven of the dissertation).

[12]Usually only one member of the family works as the regular farm servant, while others participate in casual employment in farm or non-farm work. Other male members of regular labourer's family are found to be engaged in different sorts of activities. A majority of them go in for some farm/non-farm casual employment. Sometimes, the son/brother of the regular farm servant is found to be a tenant or another farm servant (if so, usually with a different employer to secure another source of credit). Women members usually go in for casual farm work in transplanting or weeding or harvesting while the younger children in some farm servants' households go to the primary school. The regular contract with the employer ensures access to credit, taken for different purposes (like family consumption or purchasing land/bullocks or for medical expenses in the family).

[13]For a description of these test-statistics, see appendix two.

is concluded with a brief summary of findings.

6.2.1. A Probit Model

Analysis of the resurvey data suggests that family landholding plays a significant role in the workers' choice of contracts. Using a probit regression model, we shall in this section examine the factors determining the workers' choice of contracts. The probit equation identifies the factors that determines whether an individual chooses a regular job as against a casual one. Corresponding to these different factors, the predicted probability of choosing a regular contract can also be calculated.

Let there be n potential workers in the market. Given other things[14], suppose an individual i, (i = 1, 2,.., n) is free to choose from two alternative contracts available in the market, namely, casual and regular farm contracts.

Let y_i denote the choice of contract as follows :

$$y_i = 1 \text{ if the i-th labourer chooses a regular contract}$$
$$= 0 \text{ otherwise.}$$

Suppose y_i is explained by a vector of explanatory variables x such that the following regression framework holds good :

$$\begin{aligned} y_i &= \beta' x_i + u_i \\ \text{where} \quad u_i &\sim N(0\ ,\ 1) \end{aligned} \tag{1}$$

The resulting model is a probit model; the parameters of the model (β) are estimated by maximising the following log-likelihood function:

$$L = \sum_{i=1}^{n} \left[y_i \ln\Phi(\beta' x_i) + (1 - y_i) \ln(1 - \Phi(\beta' x_i)) \right] \tag{2}$$

where the subscript i refers to the number of observations. $\Phi(.)$ being the cumulative normal distribution function. Since the dependent variable is a dummy, the regression coefficients in a probit model do not reflect the marginal changes. Hence, as in chapter five, we determine the marginal effects of the regression variables in the probit model as follows:

[14]The principal focus of this chapter is on the individual's preference pattern for a particular type of contract (supply of labour). In doing so, we assume that employers are indifferent about the identity of the labourers.

$$Probit : \frac{\partial E(y)}{\partial x} = \Phi(\beta' x) * \beta \qquad (3)$$

6.2.2. Model Specification

The analysis is based on the information collected from a group of male casual and regular farm servants in Aurepalle during January 1992. There are 111 observations altogether; of these, 26 are regular labourers and 85 are casual labourers.

The dependent variable in the probit equation is PL which is defined as follows :

PL = 1 if the i-th labourer is found to be a regular one
= 0 otherwise.

Both personal and family characteristics are assumed to determine the choice of contracts. The variable of primary importance is the family landholding of the workers. As portrayed in the 'Collateral Model' as well as the 'Time Constraint Model', family wealth (total value of land and non-land resources held by the workers' family) reflects the time and credit constraints faced by the workers. However, as already shown in chapter three, there is a strong correlation between the ownership of land and non-land resources in these villages; hence, family landholding is a good index of the ownership of the productive non-land resources held by the family.

As suggested in the introduction to section 6.2, the caste factor may play an important role in the choice of contract; hence a caste variable MALAGA is included which is equal to one if the individual concerned belongs to the caste Mala or Madiga.

Besides family characteristics, some personal variables like age and literacy are also included in the regression. Upto a certain extent, age may enhance experience, though afterwards it may be an index of inability of the worker concerned. Literacy, however, may have a disincentive effect on the workers' choice of contract; more educated workers may dislike to work as farm servants for the employer without much independence.

Thus the set of explanatory variables used in the regression is as follows :

$$X = (ONE \ , \ LNAGE \ , \ LNSQAGE \ , \ ILLI \ , \ LNFLHOLD \ , \ MALAGA) \qquad (4)$$

The definitions of these variables are as given in section one of the chapter. The continuous variables, namely, age, square of age and family landholding are taken in logarithmic terms. The mean and standard deviation of the explanatory variables are shown in table 2.2.

6.2.3. Probit Estimates

The parameter estimates of the probit model are presented in table 2.3. T-ratios are given in parentheses; marginal effects are shown in the third column of the table[15].

The value of the log-likelihood function is -31.1068 while the value of the likelihood ratio (chi-square) statistic is 58.63 which is significant; this establishes the joint significance of the model. There are 92 (=77+16) correct predictions. All these statistics support the goodness of fit of the estimated model.

Secondly, we test the normality of the probit model; to this end, we compute a second likelihood ratio test (see Appendix 3). The likelihood ratio (chi-square) statistic is 0.68. The non-significance of the likelihood ratio statistic leads to the acceptance of the null hypothesis that the random term is normally distributed.

The central hypothesis H6 relates to the significance of the landholding variable LNFLHOLD in the choice of regular contracts. The coefficient of family landholding is significantly negative; this means, the larger the size of the family landholding, the lower is the likelihood that the individual concerned chooses a regular contract. Given the initial distribution of land, family landholding not only determines the level of family wealth, but also the time and credit constraints. A landless labourer is expected to be more risk-averse than a landed one. Secondly, the opportunity cost of time is lower for a landless labourer. Finally, given a lower daily wage for the regular farm jobs, landless labourers in the study villages have a comparative advantage in the regular contracts if the credit constraint in the market is effective; this is the case in Aurepalle (see chapter four). In other words, individuals from the landless/marginal farmers' family are more likely to choose a regular labour contract.

The caste factor is also found to be important to explain the workers' choice of regular contracts. The caste dummy MALAGA is positive and statistically significant in our specification. According to JGRCAST (see chapter three), both Mala and Madiga households in Aurepalle belong to the lowest caste category, namely, caste ranking four. The significance of caste factor, therefore, shows that given landholding of labourers, there is a greater likelihood of the members of Mala and Madiga households to participate in regular contracts. As already analysed in chapter three, these households hold less land compared to the higher caste households in the village and do not have many alternative opportunities of supplementing earnings. In other words, in the absence of better alternative employment

[15]We have also estimated a probit model corrected for the presence of heteroscedasticity in the continuous variables; however, a comparison of the log-likelihood functions (likelihood ratio test) suggests that we should accept the original (uncorrected) probit estimates. That is why we present the original estimates only.

opportunities to supplement agricultural earnings, the lowest caste households in the study villages may find it attractive to choose regular contracts which offer employment and credit insurance.

Next, the estimates of the variables relating to the personal characteristics of an individual, namely, LNAGE, LNSQAGE and ILLI are considered. The coefficient of LNAGE is significantly positive while that of LNSQAGE is significantly negative. Hence, it is likely for the older individuals to work in the regular labour market. However, the likelihood increases less than proportionately with age (since the coefficient of LNSQAGE is negative). The estimate, therefore, suggests that experience is important in a regular farm job.

The literacy dummy ILLI is significantly positive; hence, it is less likely for an educated member to choose a regular job. Education has a disincentive effect on the participation rates in the regular labour market. Educated labourers are found to be reluctant to participate in regular jobs which does not offer much freedom of work. An educated labourer has better opportunities to supplement agricultural-labour earnings with alternative employment, and these opportunities have to be renounced in the event where one takes up regular wage labour.

6.2.4. Family Landholding and Choice of Contract

There is a close association between the distribution of land and non-land resources in the study villages; the larger farms not only own more land and non-land resources, they also belong to the higher caste category in the village hierarchy. This is reflected in the workers' choice of contract. Risk-averse landless labourers tend to choose regular contracts while landed labourers participate in casual contracts.

Using the probit likelihood estimates, we calculate the predicted probability of an illiterate worker (ILLI=1) who belongs to Mala or Madiga (MALAGA=1) caste according to the distribution of family landholding (LNFLHOLD)[16], at its mean, median, mode, minimum and maximum values.

[16]Note that the corresponding distribution of actual family landholding (FLHOLD) are as follows : Mean = 9.384, Median = 5.000, Mode = 2.00, Minimum = 0.00, Maximum = 40 acres.

Prob (PL=1) = $\Phi(b'x)$

$P_1 = 0.6973$ *when LNFLHOLD is at its mean* = *1.612 acres*[17]
$P_2 = 0.6981$ *when LNFLHOLD is at its median value* = *1.609 acres*
$P_3 = 0.89$ *when LNFLHOLD is at its modal value* = *0.693 acres*
$P_4 = 0.9889$ *when LNFLHOLD is at its minimum* = *-0.693 acres*
$P_5 = 0.1359$ *when LNFLHOLD is at its maximum* = *3.709 acres*

The analysis suggests that family landholding plays a significant role in the occupational choice of individual participants in the rural household economies; the higher the value of the landholding, the lower is the likelihood of choosing a regular contract. In particular, for individuals with the value of landholding at its minimum, the probability of choosing a regular contract P_4 is the highest (almost close to 1) while the probability P_5 is the minimum (0.14) for those with the highest amount of landholding in the distribution (see figure 2). It follows, therefore, that other things remaining unchanged, if the distribution of land is improved, there will be a lower incidence of regular contracts.

6.2.5. An Overview

The primary implications of the Time Constraint Model and the Collateral Model (See chapter two) can be supported by the statistical significance of the workers' family landholding. The fact that the opportunity cost of pre-committing one's time is higher for landed persons induces them not to choose regular contracts. On the other hand, the opportunity cost of time is lower for landless labourers. Moreover, they face a higher marginal cost of credit because they cannot use land as a collateral. Both these factors imply that it is more likely for landless labourers to choose regular contracts in Aurepalle. Probit estimates indicate that the higher the family landholding, the lower is the likelihood of choosing a regular contract which is also reflected in the predicted probabilities that $P_4 >> P_5$.

In addition to family landholding, the caste factor plays a significant role in the choice of contract; individuals from Mala or Madiga households are more likely to choose regular contracts in Aurepalle which suggests that, in the absence of better alternative opportunities, these low-caste labourers are more likely to precommit themselves in regular contracts.

[17]However, the probability that an individual who does not belong to a Mala or Madiga household chooses a regular contract is found to be 0.17 (values of other variables being fixed at their respective means); hence, the probability of choosing a regular contract by an individual who does not belong to Mala or Madiga households is much lower than that (0.69) of one who belongs to Mala or Madiga households.

Among the personal characteristics, age has a positive impact on the probability of choosing a regular contract which suggests the requirement of experience in regular contracts. In contrast, education or formal schooling has a definite disincentive effect on the choice of regular contracts, implying the significance of better employment opportunities for educated labourers.

In other words, in addition to supporting the prediction of 'Collateral' and 'Time Constraint' Models, our analysis reveals the significant role of alternative employment opportunities in the choice of contract.

6.3. Determinants of Casual Labour Participation

Regular farm servants are supposed to work everyday for the employer during the contract period except when they are sick. However, participation in the casual labour market gives workers the freedom of combining farm/non-farm/government jobs for different employers during the course of the year, if such opportunities arise. Hence, an analysis of day-to-day participation behaviour loses its significance for regular farm servants. This section, therefore, devotes attention to the labour participation behaviour of casual labourers.

6.3.1. Participation Characteristics

An individual who is participating in a casual farm job at some time of the year is free to participate in other farm/non-farm jobs or may work in some on-going government project at another time of the year or may also work on his/her own farm. However, compared to regular jobs, casual jobs have neither the security of employment nor the credit facilities to be obtained from the employer.

Unlike the regular farm servants' market, the casual labour market in the study villages is divided between male and female labourers. Using five-years' (1980-84) ICRISAT data, we have compared the casual-labour participation characteristics of male and female casual labourers in section 4.4 of chapter four. Two measures, namely, the probability of farm labour force participation (POL) and the probability of casual farm labour participation rate (POM) are used, the difference between the two being the number of days worked on the individual's own farm (which is included in POL, but not in POM).

Here, we look back at section 4.4 of chapter four. Since landless labourers do not have the option of working on own farm, POL and POM are equal for them. The difference between POL and POM is, however, significantly positive for landed labourers reflecting the fact that landed labourers may frequently be required to work on their own plots. Secondly, the probability of casual labour participation is higher for landless labourers, reflecting a relatively lower opportunity cost of their time. Both these observations suggest, compared to the landless labourers, opportunity cost of precommitting one's time is higher for landed labourers.

6.3.2. A Tobit Model

In this section, a regression analysis is performed to determine the factors explaining male and female casual labourers' participation in farm work in the study villages.

The dependent variable of regression is LNFDAY which is the natural logarithm of the number of days worked on others' farms. The variable is a measure of the involvement of casual labourers in casual agricultural wage labour. The variable takes a value zero for a number of individuals in the sample. Hence, the best way of estimating the variable is to follow a tobit maximum likelihood method which is already described in chapter five.

Recalling from chapter five, suppose that the tobit regression equation is given as follows :

$$\begin{aligned} Y_{it} &= \beta' x + \varepsilon_{it} \ \textit{if rhs} > 0 \\ &= 0 \quad \textit{otherwise} \\ \textit{where} \quad & \varepsilon_{it} \sim N(0\ ,\ \sigma^2) \end{aligned} \tag{5}$$

As before, following Maddala (1983), the tobit likelihood function can be written as follows.

$$\log L = \sum_{0}^{n_1} \log(1 - \Phi_i) + \sum_{1}^{n_2} \log \frac{1}{\sqrt{2\pi\sigma^2}} - \sum_{1}^{n_2} \frac{1}{2\sigma^2} (y_i - \beta' x_i)^2 \tag{6}$$

where Φ_i is the cumulative normal distribution function. We maximise the likelihood function to obtain the parameters β, σ^2.

If, however, heteroscedasticity is present, the maximum likelihood estimates of the parameters will be inconsistent. Hence, one needs to correct for heteroscedasticity. In this respect, following Petersen and Waldman (1981), a multiplicative heteroscedasticity is assumed as follows:

$$\sigma_i^2 = \exp\left(\alpha' z_i\right) \tag{7}$$

where z_i is a subset of x causing heteroscedasticity. Replacing σ with σ_i in the log-likelihood function and including σ_i^2 in the summation adjusts for the presence of heteroscedasticity. Maximising the modified log-likelihood function yields values of all the parameters, namely, β, σ^2 as well as α.

6.3.3. Model Specification

Members of the sample households who are at or above the age of 6 years, residing in the village, and participating in farm/non-farm jobs are identified as casual labourers. The analysis is performed in two stages. First, we pool the three study villages together. Next, we estimate village-specific equations.

The dependent variable of interest is the natural logarithm of the number of days worked on others' farms in a given year (LNFDAY). The mean and standard deviation (given in parentheses) of the dependent variable are as follows :

Labourers	Aurepalle	Shirapur	Kanzara	All Villages
Male	3.48 (1.29)	1.32 (1.29)	3.61 (1.35)	3.44 (1.19)
Female	4.32 (0.93)	1.35 (1.11)	3.90 (1.33)	3.95 (1.19)

Farm participation in the market is assumed to be determined by the workers' personal and family characteristics as well as the availability of the job.

In addition to personal-characteristic variables like LNAGE, LNSQAGE, ILLI, a few variables reflecting family characteristics have also been included. These include the size of family landholding (LNCULT) and caste dummy CASTE4 which refers to the households belonging to the lowest caste category in the respective villages. Finally, we include an intercept term in each regression equation.

Given the significance of family characteristics in the workers' choice of contracts (section 2), we are interested in examining the role of family characteristics, namely, LNCULT and caste dummy CASTE4 in the determination of farm participation. Given the more binding nature of the time constraint, it is expected that individuals from families with larger landholdings and higher caste ranking will participate less in the market.

In the casual labour market (when all villages are pooled together) about 66% of female labourers and 56% of male labourers come from small farms or labour households; hence, a larger proportion of female labourers belong to poorer households. A majority of female labourers (75.2%) come from the lower caste groups three and four while the distribution of male casual labourers among these four caste groups is more even. These are 24.7%, 27.4%, 22.2% and 25.7% respectively.

To the extent that the availability of the job is important, two village dummies AUREPALLE and KANZARA are included in the model where all villages are pooled together[18]. In addition, four year dummies, namely, YEAR80, YEAR81, YEAR82, YEAR83 take account of the yearly variation of farm participation among male and female casual labourers.

The mean and standard deviation of the explanatory variables over this five year period (1980-84) are shown in tables 3.3 and 3.3.a.

6.3.4. Tobit Estimates

Tobit maximum likelihood estimates are presented for both male and female casual labourers as shown in tables 3.4, 3.4.a and 3.4.b respectively. T-ratios are given in parentheses.

Table 3.4 gives the tobit estimates corrected for heteroscedasticity when we pool the study villages together. LNAGE, LNSQAGE and LNCULT are the three continuous variables used in the regression. Assuming a multiplicative heteroscedastic structure, the likelihood function is modified for the presence of heteroscedasticity in these continuous variables.

A likelihood ratio (LR) statistic is computed to compare the models presented in tables 3.4 and 3.4'. The statistic which tests for the assumption of homoscedasticity is constructed as follows:

$$\begin{aligned} Female : LR &= 2(-824.5727 + 829.9836) = 10.8218 \\ Male : LR &= 2(-7962469 + 798.9846) = 5.4754 \end{aligned} \qquad (8)$$

The LR statistic follows a chi-square distribution with a degree of freedom equal to 3 which is the number of restrictions in the original tobit model. Critical values of chi-square (with

[18]These village dummies are naturally dropped when we consider these study villages individually.

degree of freedom equal to 3) are 7.815 and 11.345 at 5% and 1% levels of significance respectively. The LR statistic is, therefore, significant for female labourers at the 5% level of significance, thereby rejecting the null hypothesis of homoscedasticity. However, it is not so for male casual labourers. Hence, we obtain the following estimates for male and female casual labourers.

$$\begin{aligned}
\textbf{\textit{Male}} &: 3.96* + -2.49\ \mathit{LNAGE} + 1.26\ \mathit{LNSQAGE} - 0.08\ \mathit{ILLI} - 0.33\ \mathit{LNCULT}* \\
&\quad - 0.27\ \mathit{CASTE4} + 0.15\ \mathit{AUREPALLE} + 0.28\ \mathit{KANZARA}* - 0.41\ \mathit{YEAR80}* \\
&\quad - 0.27\ \mathit{YEAR81} - 0.03\ \mathit{YEAR82} - 0.06\ \mathit{YEAR83} \\
\textbf{\textit{Female}} &: 4.19* + (17.89 - 10.75)\ \mathit{LNAGE} - (9.02 - 5.41)\ \mathit{LNSQAGE} + 0.16\ \mathit{ILLI} \\
&\quad - (0.17 - 0.09)\ \mathit{LNCULT}* - 0.25\ \mathit{CASTE4}* + 0.59\ \mathit{AUREPALLE}* + 0.34\ \mathit{KANZARA} \\
&\quad - 0.23\ \mathit{YEAR80} - 0.04\ \mathit{YEAR81} - 0.10\ \mathit{YEAR82} + 0.003\ \mathit{YEAR83} \qquad (9)
\end{aligned}$$

where '*' indicates that the variable concerned is significant.

The coefficient of the family landholding (LNCULT) is significantly negative. This means that male and female members from families with larger landholding participate less in the casual farm work because the opportunity cost of time is higher for them. In other words, there is a greater farm participation by the individual with marginal/no landholding. Secondly, female members belonging to the lowest caste category CASTE4 participate more in casual farm employment. This, too, implies that in the absence of many alternative opportunities individuals belonging to the lowest caste category have lower opportunity cost of time and they therefore, participate more in farm employment. To some extent, the difference can be explained by the social taboo prevailing in these villages. It is not customary for a higher caste woman belonging to a family with larger landholding to work on others' fields, even if she may need to work for survival.

Interestingly enough, male participation behaviour is different from female ones with respect to caste ranking. Male participation is less (significant at 10% level) if the individual concerned belongs to the lowest caste category CASTE4. Male casual labourers primarily come from small and medium farmers owning some land. Thus, a greater male farm participation comes from the members of households with some landholding (also see table 2.1').

However, personal characteristics are not important. Neither age (LNAGE, LNSQAGE), nor the literacy variable ILLI are significant to explain number of days worked on others' farms (for male and female labourers).

To some extent, village and year dummies reflect the demand for casual farm labour.

Female labourers in Aurepalle participate significantly more in farm employment as compared to those in Shirapur or Kanzara. Among the year dummies, YEAR80 is found to be negatively significant for both male and female participation.

Given the significance of village dummies in male and female regression functions, next we consider casual labour participation at the individual village level (tables 3.4.a and 3.4.b)[19]. This enables us to examine, as to what extent, the nature of casual labour participation in the individual villages differs from the aggregate picture. A comparison between Aurepalle, Shirapur and Kanzara shows the degree of contrast between these villages. Undoubtedly, caste is the major controlling factor to determine male and female participation in Aurepalle. Predominantly, number of days worked on others' farms is higher for women from the lowest caste category while it is not so for male labourers. In Kanzara, however, family landholding is the crucial factor determining both male and female participation while caste dummy CASTE4 is significant (and negative) for male participation, though insignificant for female participation. In Shirapur, on the other hand, caste is not significant for both male and female participation. The most important factor determining casual labour participation in Shirapur is family landholding; both male and female labourers from families with larger landholding participate less in farm jobs.

To conclude, personal characteristics do not play any significant role in determining casual labour participation in any of these study villages. Family landholding is the most important determinant in all the study villages. In Aurepalle, however, caste factor, too, definitely plays a significant role while it is not so pronounced in Shirapur or Kanzara. Considering all the villages pooled together, caste factor is found to be significant; it is observed that female labourers belonging to the lowest caste and male labourers belonging relatively higher caste participate more in others' farm.

6.3.5. Significance of Non-Farm Jobs

In the casual labour market, there is a pronounced distinction between farm and non-farm jobs. Some casual labourers participate in both farm and non-farm work (including governmental work) while others are involved in farm work only. In this respect, an inter-village variation is also noted. As already discussed in section 4.5.1 of chapter four that the average number of days worked on non-farm work is higher in Shirapur and Kanzara as

[19]Note that we accept the uncorrected estimates for male and female labourers in individual study villages. This means, as before (see chapter five), the problem of heteroscedasticity is eliminated, if we control for village chracteristics.

compared to that in Aurepalle. In this context, we would like to examine, to what extent, the availability of non-farm work affects the level of farm participation in these villages.

In doing so, we repeat the same exercise as done in section 6.3.4. The difference is that we now add a dummy variable NFNG into the tobit model which takes a value 1 if the individual concerned participates in non-farm work (including governmental work). Results obtained are shown in tables 3.5, 3.5.a[20] and 3.5'. In this respect, too, a distinct division between male and female participation is found. Farm participation is significantly higher for male labourers with access to non-farm jobs in Aurepalle, Kanzara as well as all the villages taken together. This means that, for male casual labourers, farm and non-farm jobs tend to be complements rather than substitutes. However, the dummy variable NFNG is not significant for female labourers in any villages nor for all the villages taken together. This is perhaps explained by the fact that in most cases female labourers are excluded from the non-farm job opportunities so that the non-farm job dummy loses significance for them.

6.3.6. An Overview

Personal characteristics as opposed to family characteristics do not play any significant role to determine casual labour participation in the study villages. Family landholding and caste are the two most significant variables of participation. However, so far as the caste factor is concerned, there is an intervillage variation. Compared to the Maharashtra villages, relative significance of caste factor is predominant in Aurepalle. For the pooled sample, however, caste factor behaves differently for male and female labourers. Female labourers from the lowest caste category participate more in others' farms; however, male labourers from relatively higher castes do so. Secondly, we examine the role of non-farm jobs to determine casual labour participation in the study villages. In this respect, it is found that farm and non-farm jobs are complements for male labourers in the study villages. Female labourers are largely excluded from the access to non-farm jobs so that their participation does not significantly depend on non-farm jobs.

[20]Note that we do not present the estimates of Shirapur because the dummy variable NFNG is not significant in the determination of farm participation for male or female labourers.

6.4. Determinants of the Incidence of Involuntary Unemployment

Persistence of unemployment throughout the year is an important characteristic of the casual labour market in the study villages. The phenomenon of inter-seasonal adjustments in agricultural employment can partly be attributed to the seasonal nature of agricultural production. The level of farm employment declines in the slack period of production, thus, raising the level of involuntary unemployment. In this section, we consider monthly duration of unemployment[21] to examine the factors determining the incidence of involuntary unemployment among male and female casual labourers in the study villages in different seasons.

This section is developed as follows. In section 6.4.1, we describe the features of monthly duration of unemployment in the study villages before we perform a regression analysis to account for the factors determining male and female unemployment in section 6.4.3. The section is concluded with a brief overview of our findings.

6.4.1 Monthly Duration of Unemployment

In the VLS-K schedule, each individual is interviewed at a regular (monthly) interval. The details of unemployment days are obtained from the following question : how many days since the last interview was s/he unemployed in the sense described in chapter earlier[22]. Let us call this variable UNEMP in a particular month. The variable UNEMP is calculated for each month of the year 1980 (the choice of the particular year is arbitrary) for male and female casual labourers in the study villages. On the basis of this information, the distribution as well as the factors determining UNEMP is analysed.

According to the observed duration of unemployment, male and female casual labourers in the sample are divided into four groups : unemployment with duration (i) zero (no-unemployment), (ii) between 1 to five days (short duration); (iii) between six and ten days (medium duration), (iv) more than ten days (long duration) a month. For each group, the sample probability (as the relative frequency) is calculated as follows for the slack and

[21]We consider monthly duration of involuntary unemployment to be a measure of unemployment in the study villages and for the rest of this section we use these terms 'duration' and 'incidence' of unemployment interchangeably.

[22]As explained in chapter four, involuntary unemployment occurs when a person seeks employment, but fails to get one at the usual rate.

peak period[23], for the landed and landless labourers as well as for all the labourers. Suppose f_{ij} is the number of labourers in the j-th category (e.g. slack, peak, landed, landless etc.) with duration of unemployment in the ith range (where 'i'=1,2,3,4 according to the labourer, in question, has duration (i), (ii), (iii) and (iv) respectively) so that $f_j=\Sigma_i f_{ij}$ is the total number of labourers belonging to the j-th category. Therefore, the probability that a labourer belonging to the j-th category has unemployment duration of i-th range is $P_{ij} = f_{ij}/f_j$. In other words, each probability is the proportion of unemployed labourers who are found to have the duration of unemployment in the said range. These probabilities have been shown in table 4.1 and 4.1' for all villages pooled together as well as for individual villages respectively.

First we consider the *probability of 'no-unemployment'* (i.e., when UNEMP=0).

(i) The probability is clearly lower in the slack period than that in the peak period.

(ii) Landless females have a lower probability of 'no-unemployment' than landed females; probability of zero-unemployment is, however, equal for landed and landless male labourers.

(iii) Next we consider intervillage variation. Considering all farms, the probability is higher in Shirapur and Kanzara than that in Aurepalle.

Secondly, we consider the *short, medium and long duration unemployment.*

(iv) First we examine the seasonality of the incidence of unemployment; duration of unemployment varies across slack and peak periods of agricultural production. The seasonal pattern of employment is largely determined by the seasonality of the main crops in these villages. Probability of unemployment of any duration is almost unchanged for male and female labourers in the slack period. In the peak period, however, long duration unemployment declines for both male and female labourers.

(v) We compare the probability of unemployment (of different duration) between landed and landless labourers to account for the effect of family landholding. Probability of long duration unemployment is less among landless male and female labourers.

(vi) Finally, we consider inter-village variation of the incidence of unemployment. Probability of a long duration unemployment (> 10 days) is the lowest in Aurepalle and the

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[23]The peak period is the period of buoyant agricultural activities in the village. This is particularly related to certain tasks like transplanting and weeding, on the one hand, and harvesting and post-harvesting tasks, on the other. However, the concepts of peak period and slack period also vary from one village to the other. This depends on the nature of the major crops produced in a village. Because of the erratic rainfall pattern in the summer, rabi is the main crop in Shirapur and the labour demand goes up in the months of February and March. However, kharif is the main crop in Aurepalle and Kanzara. Accordingly, in these villages the proportion of labour demand is found to be relatively higher during transplanting and weeding (July, August), on the one hand, and harvesting (October, November and December) of the kharif crops, on the other. On this basis, we have generated the dummy variable PEAKPD or its complement SLACKPD.

highest in Shirapur while probability of short and medium duration unemployment is the highest in Aurepalle.

6.4.2. A Tobit Model

Preliminary observations from the study villages discussed in sections 6.4.1 suggest that among other things, the duration of unemployment varies among male and female labourers with family landholding as well as with the season of the year (peak/slack periods of agricultural production). Accordingly, we, in this section, develop a regression analysis as follows.

Suppose the dependent variable (Y_{it}) is the natural logarithm of the days unemployed in each month t, t = 1, 2,..., 12 for each of the sample individuals. The dependent variable LNUNEMP is a variable that assumes zero or positive values. Hence, applying ordinary least squares technique entails inconsistent estimators. We, instead, apply tobit maximum likelihood estimation technique[24].

As in chapter five, assuming a multiplicative heteroscedastic structure, the model is also corrected for heteroscedasticity caused by the continuous explanatory variables.

6.4.3. Model Specification

In this section, a tobit model is specified to determine the variation of the monthly duration of unemployment (LNUNEMP). Mean values of the dependent variable along with the standard deviation (in the parentheses) are as follows for individual villages.

Labourers	Aurepalle	Shirapur	Kanzara	All Villages
Male	1.19 (0.82)	1.31 (1.29)	1.21 (1.09)	1.23 (1.08)
Female	1.35 (0.82)	1.61 (1.31)	1.41 (0.11)	1.42 (1.04)

Given other things, the prevalence of involuntary unemployment in the casual labour market depends primarily on two factors : (a) the arrival of the job offer and (b) the individual's decision to accept/reject the offer depending on his/her reservation wage. While

[24]The econometric technique developed to analyse the duration of unemployment is commonly known as duration analysis (see Keifer, 1985). This is a technique to deal with search type unemployment in a dynamic framework. We, however, are concerned with involuntary unemployment in subsistence agriculture. Moreover, an application of the duration analysis requires a highly specialized data-set that observes a pool of individuals over a period of time stating the change of their employment status at every point of time. The data-set, at our disposal, however, do not indicate the change of employment status of sample labourers. Hence, we abstain from using this technique.

the former accounts for the demand for labour[25], the latter determines the supply of labour.

The agricultural labour market is seasonal in nature. For the production of a particular crop, labour demand goes up for certain operations like sowing/transplanting and harvesting (monitorable tasks). These are the operations that absorb predominantly casual labour and that take place at certain points in the production cycle. A farm may produce different crops over the production year (this usually starts in April and ends the following March); sometimes a farm produces two to three crops at the same time on different plots or even on the same plot (giving rise to intercropping) and, depending on the technique of production[26], decides the amount of labour to be hired. Hence, the arrival of a job offer is time-contingent in an agricultural labour market. To this end, we incorporate the period dummy PEAKPD.

Once a job offer arrives[27], the individual concerned decides whether to accept/reject the offer. Suppose, we consider an (involuntarily) unemployed person. Given a job offer, the decision to accept or reject the job is determined by a comparison of offered and reservation wages[28]. If the offered wage is greater than or equal to the reservation wage, the job will be accepted. The reservation wage of an individual, among other things, depends on the alternative opportunities available which, in turn, depends on the family support (see our discussion in chapter two). This is because the welfare of an unemployed person is more closely related to the time s/he spends without a job than to the mere fact of being unemployed[29]. Hence, the question of survival during a spell of unemployment assumes importance. Usually, the reservation wage is an increasing function of the level of family support; however, the reservation wage may decline as the length of the spell of

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[25]Bardhan (1984a) has shown that, contrary to the popular theories of determination of wages (subsistence theory or nutrition-based efficiency wage theory), wages and employment in the agricultural labour market are responsive to demand and productivity conditions.

[26]Some crops are more labour-intensive than others. Even for a given labour-intensity, production of some crops require more of regular labour than others.

[27]It is a common practice that in the evenings, employers, regular farm servants or their wives search for labourers to be hired the following day. In Sholapur district, employers look for more efficient and reliable workers first, and are willing to offer a premium for them. Workers who have to approach prospective employers, generally accept discounted wages. Usually caste is not a significant factor in this screening procedure.

[28]Employees are usually willing to work for almost all employers and they regularly change their employer during the course of the year as they find jobs. It is not unusual for a single labourer to work with more than twenty employers in a year's time.

[29]This is noteworthy. In the literature (for an overview, see Drèze & Mukherjee, 1987), an emphasis has been laid on the unemployment figures, i.e., how many of the labourers are unemployed in different years. However, the latter is not very relevant in the analysis of poverty of the agricultural labourers. More relevant is the duration of unemployment and how an agricultural labourer can survive that particular spell.

unemployment increases. The latter happens because a longer spell has a direct disutility of its own, or because the individual anticipates the effects of being stigmatised or because some of the personal attributes (like family support) may be negatively related to the length of time spent out of work.

In these household economies, the family is the basic social unit and the primary means of survival during any spell of unemployment. For example, if the husband does not have any job for a few days, he can still survive on his son and/or wife's earnings (when either or both of them also earn in the casual labour market). If the female member of a labourer's family[30] does not get work for some days, crop income from the family farm might yield adequate support. There may be other sources of family income as well. For example, a shepherd's family earns from animal husbandry or a weaver's family from weaving or a toddy-tapper's family from selling toddy in the market. These jobs are often caste-related. Even if labour income fails at times (particularly in the slack agricultural seasons), the family as a unit continues to survive from other sources of income. Hence, family landholding and caste are included to determine the duration of unemployment.

In addition to family characteristics, some personal characteristics like age and education variables may also affect each worker's reservation wage. To this end, we include age and literacy variables.

Estimation is done in two stages. First, we consider all the villages pooled together and then we use village-specific regressions. For each individual, the following explanatory variables have been included : natural logarithm of age in years (LNAGE), natural logarithm of square of age (LNSQAGE), education dummy (ILLI), natural logarithm of the size of family landholding (LNCULT), peak period dummy (PEAKPD), caste dummy (CASTE4) and the intercept term (ONE). When we consider all the villages together, we include two village dummies, namely, AUREPALLE and KANZARA[31]. The mean and standard deviation (given in parentheses) of the explanatory variables for male and female labourers are given in tables 4.3 and 4.3.a.

6.4.4. Tobit Estimates

Using monthly data on the duration of unemployment for the year 1980, a tobit

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[30]Usually, the female members of a farmer's family participate in casual employment while the husband and/or son work on the family farm.

[31]These village dummies are naturally dropped when we consider individual villages.

regression function explaining the natural logarithm of UNEMP (LNUNEMP) is estimated for male and female labourers in the study villages. Two sets of estimates, one for all villages and the other for individual villages are given in tables 4.4, 4.4.a and 4.4.b. The t-ratios are given in parentheses.

Assuming that the continuous regressors LNAGE, LNSQAGE and LNCULT cause heteroscedasticity, tobit estimates for all villages taken together are corrected for heteroscedasticity (table 4.4'). In order to test the assumption of homoscedasticity, a likelihood ratio (LR) statistic is computed as follows :

$$\begin{aligned} Male &: LR = 2(-255.2313 + 256.7490) = 3.0354 \\ Female &: LR = 2(-423.0782 + 425.8909) = 5.6254 \end{aligned} \tag{10}$$

which follows a chi-square distribution with a degree of freedom equal to 3. Comparing these values with the critical values of chi-square at 5% and 1% levels of significance, it can be concluded that the assumption of homoscedasticity cannot be rejected for both male and female labourers and, hence, we accept the original tobit estimates as follows :

$$\begin{aligned} \textbf{\textit{Male}} &: 1.75 * + 0.31\ LNAGE - 0.11\ LNSQAGE + 0.10\ ILLI + 0.11\ LNCULT * \\ &\quad - 0.02\ CASTE4 - 0.02\ PEAKPD * - 0.62\ AUREPALLE * - 0.25\ KANZARA * \\ \textbf{\textit{Female}} &: 2.65 * + 1.13)\ LNAGE - 0.58\ LNSQAGE - 0.14\ ILLI + 0.06\ LNCULT * \\ \textbf{(11)} &\quad - 0.03\ CASTE4 - 0.22\ PEAKPD* - 0.70\ AUREPALLE * - 0.35\ KANZARA * \end{aligned}$$

where '*' indicates that the relevant variable is significant.

As in farm participation, personal characteristics like age or literacy are not significant in the determination of the duration of unemployment for both male and female casual labourers.

The coefficient of the family landholding LNCULT is positive for both male and female labourers. This means that the duration of unemployment is higher for individuals belonging to households with larger landholdings. As discussed in the beginning of this section, the days worked on the individual's own farm are not included in the number of days involuntarily unemployed. The duration of involuntary unemployment refers to that period when an individual looks for jobs, but is unable to obtain one at the going wage rate[32]. It may imply one of the following or both :

(a) Individuals from families with larger landholdings look for the kind of jobs not easily available (e.g., because they have a high reservation wage) so that the duration of unemployment that they experience is higher.

(b) Employers may not like those who come to the labour market occasionally at their discretion; instead they may prefer those labourers who are in the market throughout the year.

The caste dummy is not significant for both male and female labourers.

Next, we consider the significance of the dummy variables. The period dummy PEAKPD is significantly negative for both male and female labourers. This implies that the duration of unemployment among male and female casual labourers is significantly less in the peak period when there is a buoyant demand for all kinds of labour. The village dummies are also significant which, to some extent, justifies the role of village-specific demand in generating rural employment/unemployment. Male and female labourers in Kanzara experience a significantly lower duration of unemployment compared to Aurepalle or Shirapur.

However, the statistical significance of village dummies may also reflect the difference in the nature of unemployment prevailing in these individual villages[33]. Hence, at the second stage, we consider these villages individually to examine if it throws some light on our understanding. A comparison among the study villages (tables 4.4.a and 4.4.b) shows that male and female unemployment in Aurepalle declines during the peak period though family landholding is not significant for either group in Aurepalle. In Shirapur and Kanzara, however, family landholding is significant to explain female unemployment such that the female members of a large farmer's family have a longer duration of unemployment. On the other hand, the duration of unemployment among male members does not depend on family landholding, but on the period dummy PEAKPD such that duration declines in Aurepalle and Shirapur during the peak period.

Both family landholding (LNCULT) and the seasonal dummy (PEAKPD) are significant for male and female labourers in the aggregate sample. However, a disaggregation at the village level enables us to specify the nature of male and female unemployment in the

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[32]Given the definition of involuntary unemployment in the data set, the explanation for 'search' type of unemployment in which the offered wage is less than the reservation wage does not hold good here.

[33]Note that we accept the uncorrected estimates for male and female labourers in individual study villages. This means, as in farm participation, the problem of heteroscedasticity is eliminated, if we control for village chracteristics.

individual villages.

6.4.5. An Overview

The analysis of unemployment in this section suggests that like casual labour participation, the duration of unemployment is dependent on family landholding where individuals from larger farms have a longer duration of unemployment. However, unlike participation, the significance of family landholding as a determinant of unemployment reflects the demand-side responses in the market. This may be related to the lack of the kind of jobs that, a landed labourer looks for or to the employer's reluctance to employ an occasional entrant in the market which is very much the case with landed labourers[34]. A disaggregation among the villages shows that unemployment is significantly higher for female labourers in Kanzara, but not so in Aurepalle.

Secondly, given the availability of labour, a lack of seasonal and local demand for farm and non-farm jobs also plays a crucial role in the determination of unemployment. This is suggested by the significance of both seasonal (PEAKPD is significant) and village-specific dummy (AUREPALLE and KANZARA are significant) variables. The monthly duration of unemployment is shorter during the peak periods of agricultural production when there is a higher demand for labour. This holds good irrespective of whether we consider pooled sample villages or individual sample villages. Unemployment among both male and female labourers declines during the peak period.

In other words, unlike casual labour participation, the incidence of casual unemployment in the study villages can, to a large extent, be explained by the pattern of labour demand.

Conclusion

This chapter began by focusing on the choice between casual and regular farm contracts. The analytical and empirical literature on the choice of contract is relatively scanty; existing studies (Binswanger and Rosenzweig, 1982; Bardhan, 1984a; Eswaran and Kotwal, 1985a) emphasize labour demand factors. In this chapter, however, we focus on the

[34]Landed labourers can work for others' farms only when they do not have much work left on their own farms.

significance of the supply factors, especially those related to the size of family landholdings, reflecting workers' time and credit constraints. The results obtained from the ICRISAT villages suggest that there is significant self-selection in these rural labour markets. Predominantly, risk-averse male labourers from the families with smaller landholdings participate in regular farm labour as opposed to casual labour who have a low opportunity cost of time and high marginal cost of credit. The strength of this supply force cannot be ignored. In fact, there is growing evidence in these villages that labourers are increasingly reluctant to choose regular contracts while employers complain about the non-availability of reliable regular labourers (also see chapter seven).

Secondly, casual labour participation behaviour among male and female casual labourers is considered. Interestingly enough, personal characteristics do not play any significant role in this respect. However, the significant role of family landholdings cannot be ignored. Male and female labourers from the families with smaller landholdings participate more on others' farms because their opportunity cost of time is low. Caste is another important factor where the male-female distinction is pronounced. Female labourers belonging to the lowest caste category participate more on others' farms while it is the male labourers belonging to relatively higher castes who do the same. Secondly, farm and non-farm jobs are found to be complements in casual male labour participation; female members, however, are excluded from casual non-farm jobs in these villages.

Finally, we determine the incidence of involuntary unemployment among male and female casual labourers. Unlike determinants of choice of contract and those of casual labour participation, the strength of demand forces seems to be unambiguous in the determination of unemployment. The duration of unemployment is higher among landed labourers in the study villages. Secondly, unemployment significantly depends on the seasonality of labour demand such that its incidence declines in the peak period of agricultural production. Finally, unemployment is longer in the less prosperous villages like Shirapur compared to Kanzara. All these results reflect the significant role of demand factors in the determination of unemployment.

CHAPTER 6 : TABLES

TABLE 2. Family Characteristics of Regular Farm Servants in Aurepalle, 1992

Caste			Family Landholding (Acres)			FATHRFS	
Malaga	Gowda	Others	≤ 2	≤ 5	> 5	1	0
85	15	0	65.4	34.6	0	65.4	34.6

Note : All frequencies are given in per cent. 'FATHRFS' is a dummy variable which takes a value one if the father of the regular farm servant is/was a also a regular farm servant, at least for some time in his life.

TABLE: 2'. Family Characteristics of Casual Labourers in Aurepalle, 1992

Caste			Family Landholding (Acres)		
Malaga	Gowda	Kurma	≤ 2	≤ 5	> 5
24.7	28.2	10.6	24.7	7.0	68.3

Note : All frequencies are given in per cent. Also note that the information regarding the father's occupation was not collected for the casual labourers.

TABLE 2". Family Landholding and Choice of Contract : Chi-Square Test Statistics

Test Statistics	Values
Pearson's Correlation between PL and FLHOLD	-0.39 (4.54)[1]
Pearson's Chi-Square between PL and FLHOLD Likelihood Ratio Chi-Square between PL and FLHOLD	67.79 (33)[2] 75.45 (33)

Note : [1] The value in parentheses indicates the associated T-statistic.
[2] The value in parentheses indicates the degree of freedom.

TABLE 2.2. Determinants of Workers' Choice of Contracts :
Mean and Standard Deviation of Explanatory Variables

Variable	Mean	Standard Deviation
LNAGE	3.40	0.56
LNSQAGE	6.80	1.13
ILLI	0.66	0.48
LNFLHOLD	1.61	1.19
MALAGA	0.39	0.49

Note : Definition of these variables are given in section 6.1 of the chapter.

TABLE 2.3. Probit Estimates of Workers' Choice of Regular Contracts

Dependent Variable : PL = 1 if the i-th individual chooses a regular contract

Variables	Coefficient (T-Ratio)	Marginal Effects (T-Ratio)
ONE	-1.24 (0.928)	-0.21 (0.946)
LNAGE	116.62 (2.254)*	19.92 (2.070)*
LNSQAGE	-58.30 (2.251)*	-9.96 (2.067)*
ILLI	1.46 (2.673)*	0.25 (2.297)*
LNFLHOLD	-0.77 (3.170)**	-0.13 (3.046)**
MALAGA	1.48 (3.107)**	0.25 (2.642)*
$\hat{L}$	-31.1068	*
LR (χ^2_5)	58.63	*
Correct Prediction	77+16	*
No. of Observations	111	111

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%.*

TABLE 3.3. Determinants of Casual Labour Participation :
Mean and Standard Deviation of the Explanatory Variables, *All Villages* and *Shirapur*

Variables	All Villages Mean (Standard Deviation)		Shirapur Mean (Standard Deviation)	
	Male	Female	Male	Female
LNAGE	3.29 (0.57)	3.28 (0.56)	3.42 (0.55)	3.39 (0.50)
LNSQAGE	6.59 (1.13)	6.57 (1.11)	6.85 (1.09)	6.79 (1.01)
LNCULT	1.57 (1.19)	1.19 (0.96)	0.44 (0.49)	0.82 (0.39)
ILLIT	0.10 (0.29)	0.06 (0.23)	1.89 (1.28)	1.16 (1.09)
CASTE4	0.22 (0.42)	0.33 (0.47)	0.12 (0.33)	0.21 (0.41)
AUREPALLE	0.36 (0.48)	0.25 (0.44)	*	*
KANZARA	0.21 (0.41)	0.20 (0.40)	*	*
YEAR80	0.21 (0.41)	0.20 (0.40)	0.23 (0.42)	0.21 (0.41)
YEAR81	0.22 (0.42)	0.22 (0.42)	0.24 (0.43)	0.19 (0.39)
YEAR82	0.22 (0.42)	0.21 (0.41)	0.20 (0.40)	0.23 (0.42)
YEAR83	0.19 (0.39)	0.19 (0.41)	0.20 (0.40)	0.18 (0.38)
No. of Obs.	482	540	174	137

TABLE 3.3'. Determinants of Casual Labour Participation :
Mean and Standard Deviation of the Explanatory Variables, *Aurepalle* and *Kanzara*

Variables	Aurepalle Mean (Standard Deviation)		Kanzara Mean (Standard Deviation)	
	Male	Female	Male	Female
LNAGE	3.05 (0.54)	3.26 (0.52)	3.29 (0.57)	3.24 (0.61)
LNSQAGE	6.11 (1.08)	6.53 (1.04)	6.59 (1.13)	6.48 (1.22)
ILLIT	0.71 (0.46)	0.92 (0.27)	0.44 (0.49)	0.73 (0.45)
LNCULT	1.16 (0.96)	1.16 (0.99)	1.49 (1.16)	1.23 (0.85)
CASTE4	0.44 (0.49)	0.53 (0.50)	0.21 (0.41)	0.23 (0.42)
YEAR80	0.24 (0.43)	0.18 (0.39)	0.18 (0.39)	0.21 (0.41)
YEAR81	0.23 (0.42)	0.23 (0.42)	0.21 (0.41)	0.23 (0.42)
YEAR82	0.29 (0.46)	0.21 (0.41)	0.21 (0.41)	0.21 (0.41)
YEAR83	0.16 (0.36)	0.19 (0.39)	0.20 (0.40)	0.19 (0.39)
No. of Obs.	97	184	211	219

TABLE 3.4. Tobit Estimates of Casual Labour Participation, *All Villages*

Dependent Variable : LNFDAY = Natural logarithm of the number of days worked on others' farms

Variable	Male	Female
	Coefficient (T-Ratio)	Coefficient (T-Ratio)
ONE	3.96 (9.155)**	4.19 (11.773)**
LNAGE	-2.49 (0.147)	18.72 (1.372)
LNSQAGE	1.26 (0.148)	-9.44 (1.383)
ILLI	-0.08 (0.589)	0.19 (1.385)
LNCULT	-0.33 (6.336)**	-0.21 (4.128)**
CASTE4	-0.27 (1.771)	0.27 (2.390)*
AUREPALLE	0.15 (0.846)	0.67 (5.069)**
KANZARA	0.28 (2.083)*	0.37 (3.019)**
YEAR80	-0.41 (2.078)*	-0.19 (1.205)
YEAR81	-0.27 (1.390)	-0.0001 (0.001)
YEAR82	-0.03 (0.016)	-0.09 (0.580)
YEAR83	-0.06 (0.324)	-0.03 (0.159)
σ^2	1.27 (30.451)**	1.12 (32.648)*
$\hat{L}$	-798.9446	-829.9836
No. of Obs.	482	540

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%.*

TABLE 3.4.a. Tobit Estimates of Casual Labour Participation, *Aurepalle* and *Kanzara*

Dependent Variable : LNFDAY = Natural logarithm of the number of days worked on others' farms

Variable	Aurepalle Coefficient (T-Ratio)		Kanzara Coefficient (T-Ratio)	
	Male	Female	Male	Female
ONE	6.35 (6.990)**	4.34 (9.527)**	3.16 (5.204)**	4.44 (7.571)*
LNAGE	23.35 (0.638)	3.91 (0.215)	12.25 (0.519)	13.58 (0.563)
LNSQAGE	-12.08 (0.659)	-1.99 (0.219)	-5.91 (0.501)	-6.89 (0.572)
ILLI	-0.23 (0.765)	0.01 (0.039)	0.06 (0.309)	0.55 (2.402)*
LNCULT	0.07 (0.554)	0.05 (0.807)	-0.54 (7.171)**	-0.34 (3.293)*
CASTE4	-0.05 (2.191)*	0.66 (5.054)**	-0.72 (3.292)**	0.11 (0.505)
YEAR80	-0.11 (0.218)	-0.13 (0.634)	0.07 (0.238)	0.12 (0.400)
YEAR81	-0.57 (1.175)	-0.13 (0.642)	-0.23 (0.890)	0.14 (0.493)
YEAR82	-0.48 (1.038)	-0.22 (1.084)	0.09 (0.375)	0.08 (0.257)
YEAR83	-0.14 (0.264)	-0.49 (2.397)*	-0.06 (0.229)	0.38 (1.253)
σ^2	1.20 (13.694)**	0.85 (19.183)**	1.20 (20.228)**	1.29 (20.683)*
$\hat{L}$	-155.1069	-231.8148	-337.0851	-366.4236
Obs.	97	184	211	219

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. Also note that the likelihood ratio test of heteroscedasticity is not significant; hence, we present the uncorrected tobit estimates for Aurepalle and Kanzara.*

TABLE 3.4.b. Tobit Estimates of Casual Labour Participation, *Shirapur*

Dependent Variable : LNFDAY = Natural logarithm of the number of days worked on others' farms

Variable	Shirapur Coefficient (T-Ratio)	
	Male	Female
ONE	4.00 (5.883)**	6.01 (9.205)**
LNAGE	-32.09 (1.157)	56.14 (2.310)*
LNSQAGE	16.06 (1.156)	-28.274 (2.324)*
ILLI	-0.42 (2.777)*	-0.19 (0.779)
LNCULT	-0.26 (3.299)**	-0.41 (5.189)**
CASTE4	0.12 (0.397)	-0.36 (1.693)
YEAR80	-1.15 (3.765)**	-0.97 (3.477)**
YEAR81	-0.21 (0.680)	-0.26 (0.992)
YEAR82	0.19 (0.614)	-0.46 (1.748)
YEAR83	-0.12 (0.389)	-0.09 (0.345)
σ^2	1.15 (18.222)**	0.95 (16.446)**
$\hat{L}$	-270.4084	-187.5089
No. of Obs.	174	137

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. Also note that the likelihood ratio test of heteroscedasticity is not significant; hence, we present the uncorrected tobit estimates for Shirapur.*

Variables Causing Heteroscedasticity : Z = (LNAGE, LNSQAGE, LNCULT)

TABLE 3.4'. Tobit Estimates of Casual Labour Participation, Corrected for Heteroscedasticity, ***All Villages***

Variable	Male	Female
	Coefficient (T-Ratio)	Coefficient (T-Ratio)
ONE	3.99 (8.553)**	4.19 (10.328)**
LNAGE	-2.52 (0.134)	17.89 (1.067)
LNSQAGE	1.28 (0.136)	-9.02 (1.076)
ILLI	-0.06 (0.415)	0.16 (1.203)
LNCULT	-0.34 (5.956)**	-0.17 (2.484)*
CASTE4	-0.31 (2.055)*	0.25 (2.005)*
AUREPALLE	0.17 (0.880)	0.59 (3.940)**
KANZARA	0.24 (1.717)	0.34 (2.565)*
YEAR80	-0.51 (2.563)*	-0.23 (1.484)
YEAR81	-0.29 (1.419)	-0.04 (0.248)
YEAR82	-0.04 (0.165)	-0.10 (0.625)
YEAR83	-0.12 (0.532)	0.003 (0.018)
LNAGE	10.59 (0.991)	-10.75 (1.188)
LNSQAGE	-5.31 (0.994)	5.41 (1.195)
LNCULT	-0.06 (2.254)*	0.09 (2.532)*
σ^2	1.56 (4.608)**	0.79 (4.190)**
$\hat{L}$	-796.2469	-824.5727
No. of Obs.	482	540

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. Also note that the likelihood ratio test of heteroscedasticity is not significant for male labourers, though it is for female labourers.*

TABLE 3.5. Significance of Non-Farm Jobs : Tobit Estimates, All Villages

Variables	Male T-Ratio (Coefficient)	Female T-Ratio (Coefficient)
ONE	3.58 (8.066)**	4.04 (10.886)**
LNAGE	-2.38 (0.142)	17.72 (1.299)
LNSQAGE	1.22 (0.145)	-8.93 (1.309)
ILLI	-0.10 (0.806)	0.20 (1.393)
LNCULT	-0.31 (5.825)**	-0.20 (3.988)**
CASTE4	-0.35 (2.253)*	0.24 (2.166)*
NFNG	0.39 (3.187)**	0.17 (1.401)
AUREPALLE	0.35 (1.864)	0.74 (5.246)**
KANZARA	0.38 (2.804)*	0.42 (3.275)**
YEAR80	-0.46 (2.334)*	-0.19 (1.173)
YEAR81	-0.27 (1.397)	0.01 (0.069)
YEAR82	-0.02 (0.083)	-0.07 (0.468)
YEAR83	-0.02 (0.119)	-0.005 (0.032)
σ^2	1.26 (30.452)**	1.12 (32.648)**
$\hat{L}$	-793.9156	-829.0043
No. of Obs.	482	540

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%.*

TABLE 3.5.a. Significance of Non-Farm Jobs : Tobit Estimates, Aurepalle and Kanzara

Variables	Aurepalle T-Ratio (Coefficient)		Kanzara T-Ratio (Coefficient)	
	Male	Female	Male	Female
ONE	6.57 (7.641)**	4.29 (9.427)**	2.96 (4.831)**	4.53 (7.506)**
LNAGE	26.92 (0.779)	2.31 (0.127)	13.48 (0.576)	13.24 (0.549)
LNSQAGE	-13.911 (0.803)	-1.19 (0.130)	-6.52 (0.557)	-6.73 (0.559)
ILLI	-0.20 (0.690)	0.002 (0.009)	0.07 (0.319)	0.55 (2.392)*
LNCULT	0.02 (0.150)	0.05 (0.832)	-0.48 (6.144)**	-0.36 (3.352)**
CASTE4	-0.67 (2.153)*	0.62 (4.666)**	-0.72 (3.348)*	0.15 (0.659)
NFNG	1.06 (3.504)**	0.26 (1.246)	0.33 (1.951)*	-0.15 (0.639)
YEAR80	-0.21 (0.465)	-0.14 (0.666)	-0.13 (0.487)	0.12 (0.397)
YEAR81	-0.43 (0.944)	-0.12 (0.604)	-0.26 (1.006)	0.13 (0.465)
YEAR82	-0.39 (0.904)	-0.21 (1.060)	0.04 (0.146)	0.06 (0.205)
YEAR83	-0.05 (0.103)	-0.48 (2.350)*	-0.04 (0.167)	0.36 (1.188)
σ^2	1.14 (13.708)**	0.85 (19.183)**	1.19 (20.227)**	1.29 (20.683)**
$\hat{L}$	-149.2866	-231.0416	-335.3861	-366.2197
No. of Obs.	97	184	211	219

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. We do not, however, present the estimates for Shirapur because the dummy variable NFNG is not significant. Also note that the likelihood ratio test of heteroscedasticity is not significant; hence, we present the uncorrected tobit estimates for individual villages.*

TABLE 4.1. Distribution of Monthly Duration of Unemployment in 1980, All Villages

Sex	Sample	Duration of Unemployment (Days)			
		0	1 ≤ duration ≤ 5	6 ≤ duration ≤ 10	duration > 10
Male Female	*Slack* *Period*	0.34 0.26	0.23 0.21	0.23 0.27	0.20 0.26
Male Female	*Peak* *Period*	0.40 0.28	0.21 0.35	0.26 0.21	0.13 0.16
Male Female	*Landed*	0.36 0.49	0.23 0.04	0.23 0.24	0.18 0.23
Male Female	*Land-less*	0.36 0.25	0.22 0.29	0.28 0.25	0.14 0.21
Male Female	*All Farms*	0.36 0.26	0.22 0.27	0.24 0.25	0.18 0.22

TABLE 4.1'. Distribution of Monthly Duration of Unemployment in 1980, Individual Villages

Sex	Sample	Duration of Unemployment (Days)											
		Duration = 0			1 ≤ Duration ≤ 5			6 ≤ Duration ≤ 10			Duration > 10		
		A	C	E	A	C	E	A	C	E	A	C	E
M F	*Slack*	.26 .17	.40 .34	.34 .30	0.31 0.24	0.12 0.08	0.27 0.23	0.39 0.46	0.12 0.11	0.15 0.30	0.04 0.13	0.36 0.46	0.24 0.17
M F	*Peak*	.27 .21	.50 .38	.45 .32	0.37 0.50	0.20 0.12	0.13 0.24	0.36 0.26	0.15 0.13	0.24 0.18	0.00 0.03	0.15 0.37	0.19 0.26
M F	*Landed*	.25 .19	.41 .36	.42 .32	0.34 0.33	0.09 0.05	0.22 0.24	0.39 0.39	0.14 0.13	0.17 0.13	0.02 0.09	0.36 0.46	0.19 0.31
M F	*Land-* *less*	.43 .18	.44 .33	.32 .26	0.43 0.45	0.26 0.13	0.19 0.24	0.14 0.32	0.07 0.10	0.36 0.34	0.00 0.05	0.23 0.44	0.12 0.16
M F	*All* *Farm*	.26 .19	.42 .34	.39 .31	0.35 0.35	0.13 0.10	0.21 0.24	0.37 0.38	0.13 0.11	0.24 0.17	0.02 0.08	0.32 0.45	0.17 0.28

Note : A, C and E refer to the study villages, namely, Aurepalle, Shirapur and Kanzara respectively.'M' and 'F' denote male and female labourers respectively.

TABLE 4.3. Determinants of the Incidence of Unemployment in 1980 :
Mean and Standard Deviation of Explanatory Variables, *All Villages* and *Shirapur*

Variable	All Villages Mean (Standard Deviation)		Shirapur Mean (Standard Deviation)	
	Male	Female	Male	Female
LNAGE	3.21 (0.61)	3.20 (0.62)	3.31 (0.62)	3.23 (0.54)
LNSQAGE	6.42 (1.22)	6.39 (1.23)	6.62 (1.24)	6.46 (1.07)
ILLI	0.56 (0.50)	0.89 (0.31)	0.30 (0.46)	0.78 (0.42)
LNCULT	1.31 (1.08)	1.13 (0.88)	1.58 (1.21)	0.79 (0.98)
CASTE4	0.27 (0.45)	0.40 (0.49)	0.17 (0.38)	0.16 (0.37)
PEAKPD	0.36 (0.48)	0.40 (0.49)	0.19 (0.39)	0.18 (0.39)
AUREPALLE	0.24 (0.43)	0.41 (0.49)	*	*
KANZARA	0.50 (0.50)	0.44 (0.50)	*	*
No. of Obs.	407	597	103	87

TABLE 4.3.a. Determinants of the Incidence of Unemployment in 1980:
Mean and Standard Deviation of Explanatory Variables, *Aurepalle* and *Kanzara*

Variable	Aurepalle Mean (Standard Deviation)		Kanzara Mean (Standard Deviation)	
	Male	Female	Male	Female
LNAGE	2.79 (0.54)	3.29 (0.55)	3.36 (0.53)	3.10 (0.68)
LNSQAGE	2.57 (1.08)	6.58 (1.10)	6.73 (1.06)	6.20 (1.37)
ILLI	0.79 (0.40)	0.98 (0.14)	0.57 (0.49)	0.86 (0.35)
LNCULT	1.47 (0.73)	1.18 (0.86)	1.09 (1.11)	1.21 (0.85)
CASTE4	0.44 (0.50)	0.56 (0.49)	0.24 (0.43)	0.33 (0.47)
PEAKPD	0.45 (0.50)	0.44 (0.49)	0.39 (0.49)	0.44 (0.49)
No.of Obs.	99	245	205	265

TABLE 4.4. Tobit Estimates of Incidence of Unemployment, *All Villages*

Dependent Variable : LNUNEMP

Variable	Male	Female
	Coefficient (T-Ratio)	Coefficient (T-Ratio)
ONE	1.75 (6.135)**	2.65 (13.796)**
LNAGE	0.31 (0.027)	1.13 (0.112)
LNSQAGE	-0.11 (0.019)	-0.58 (0.115)
ILLI	0.10 (1.048)	-0.14 (1.216)
LNCULT	0.11 (2.408)*	0.06 (1.989)*
CASTE4	0.02 (0.224)	-0.03 (0.387)
PEAKPD	-0.02 (2.225)*	-0.22 (3.519)**
AUREPALLE	-0.62 (4.303)**	-0.70 (6.728)**
KANZARA	-0.25 (2.211)*	-0.35 (3.528)**
σ^2	0.65 (23.170)**	0.64 (29.969)**
$\hat{L}$	-256.7490	-425.8908
No. of Observations	407	597

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%.*

TABLE 4.4.a. Tobit Estimates of the Incidence of Unemployment, *Aurepalle* and *Kanzara*

Dependent Variable : LNUNEMP

Variable	Aurepalle Coefficient (T-Ratio)		Kanzara Coefficient (T-Ratio)	
	Male	Female	Male	Female
ONE	1.25 (3.275)**	1.45 (4.124)**	1.19 (2.379)*	2.42 (8.893)**
LNAGE	-41.25 (1.808)	-4.86 (0.371)	1.09 (0.066)	-9.35 (0.484)
LNSQAGE	20.74 (1.813)	2.43 (0.370)	-0.46 (0.055)	4.61 (0.478)
ILLI	-0.13 (0.700)	0.38 (1.313)	-0.009 (0.054)	-0.09 (0.570)
LNCULT	-0.05 (0.524)	-0.03 (0.674)	0.09 (1.309)	0.13 (2.027)*
CASTE4	0.14 (1.065)	0.10 (1.336)	0.05 (0.367)	-0.19 (1.725)
PEAKPD	-0.18 (1.999)*	-0.42 (5.703)**	-0.24 (2.044)*	0.009 (0.088)
σ^2	0.43 (12.120)**	0.51 (20.101)**	0.64 (16.115)**	0.70 (19.487)**
$\hat{L}$	-42.0252	-147.2251	-122.1574	-195.5188
No. of Obs.	99	245	205	265

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. Also note that the likelihood ratio test of heteroscedasticity is not significant for male labourers while it is significant for female labourers. Hence, we present both corrected and uncorrected tobit estimates for Aurepalle and Kanzara.*

TABLE 4.4.b. Tobit Estimates of the Incidence of Unemployment, *Shirapur*

Variable	Shirapur Coefficient (T-Ratio)		Shirapur Corrected Coefficient (T-Ratio)	
	Male	Female	Male	Female
ONE	2.88 (3.946)**	2.18 (3.926)**	1.82 (2.393)*	2.12 (3.211)**
LNAGE	13.87 (0.436)	6.43 (0.259)	11.52 (0.388)	10.04 (0.469)
LNSQAGE	-7.03 (0.442)	-3.15 (0.254)	-5.68 (0.383)	-4.97 (0.465)
ILLI	-0.05 (0.176)	-0.25 (1.089)	-0.14 (0.421)	-0.04 (0.145)
LNCULT	0.14 (1.422)	0.11 (2.235)*	0.06 (0.421)	0.11 (1.081)
CASTE4	-0.34 (0.862)	-0.11 (0.467)	-0.09 (0.192)	-0.19 (0.775)
PEAKPD	-0.69 (2.624)*	-0.28 (2.110)*	-0.70 (2.322)*	-0.07 (0.227)
LNAGE	*	*	16.14 (0.284)	4.51 (0.112)
LNSQAGE	*	*	-8.13 (0.285)	-2.28 (0.113)
LNCULT	*	*	-0.20 (1.361)	0.34 (2.273)*
σ^2	0.76 (11.327)**	0.67 (10.732)**	1.49 (0.744)	0.93 (1.199)
$\hat{L}$	-69.9005	-58.5107	-67.6602	-52.9078
No. of Obs.	103	87	103	87

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. Also note that the likelihood ratio test of heteroscedasticity is not significant for male labourers while it is significant for female labourers. Hence, we present both corrected and uncorrected tobit estimates for Shirapur.*

Variables Causing Heteroscedasticity : Z = (LNAGE, LNSQAGE, LNCULT)

TABLE 4.4'. Tobit Estimates of the Incidence of Unemployment : Corrected for Heteroscedasticity, All Villages

Dependent Variable : LNUNEMP

Variable	Male	Female
	Coefficient (T-Ratio)	Coefficient (T-Ratio)
ONE	1.66 (5.894)**	2.69 (13.986)**
LNAGE	1.99 (0.143)	2.24 (0.021)
LNSQAGE	-0.93 (0.133)	-0.14 (0.025)
ILLI	0.07 (0.782)	-0.15 (1.464)
LNCULT	0.09 (1.951)*	0.05 (1.354)
CASTE4	0.02 (0.180)	0.03 (0.450)
PEAKPD	-0.05 (0.583)	-0.23 (3.394)**
AUREPALLE	-0.59 (4.087)**	-0.69 (5.999)**
KANZARA	-0.26 (2.627)*	-0.33 (3.221)**
LNAGE	2.94 (0.169)	9.74 (0.779)
LNSQAGE	-1.48 (0.170)	-4.81 (0.769)
LNCULT	-0.08 (1.395)	-0.03 (0.686)
σ^2	0.77 (2.958)*	0.44 (4.276)**
$\hat{L}$	-255.2313	-423.0782
No. of Obs.	407	597

Note : '' denotes that the variable concerned is significant at 5% while '**' implies that it is significant at 1%. Also note that the likelihood ratio test of heteroscedasticity is not significant. Hence, we accept the uncorrected tobit estimates.*

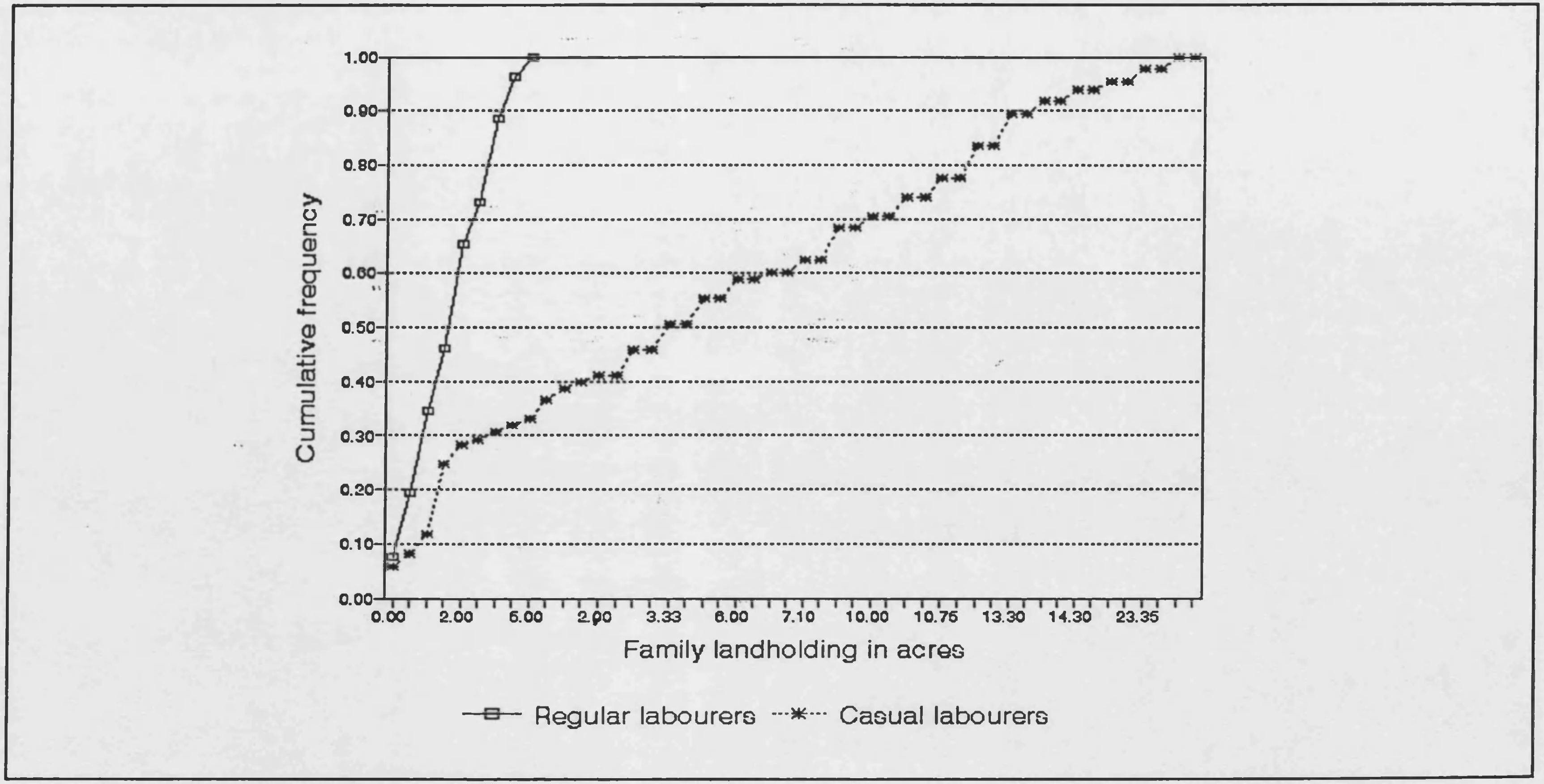

Figure 1. Cumulative distribution of casual and regular labourers' family landholding (in acres).

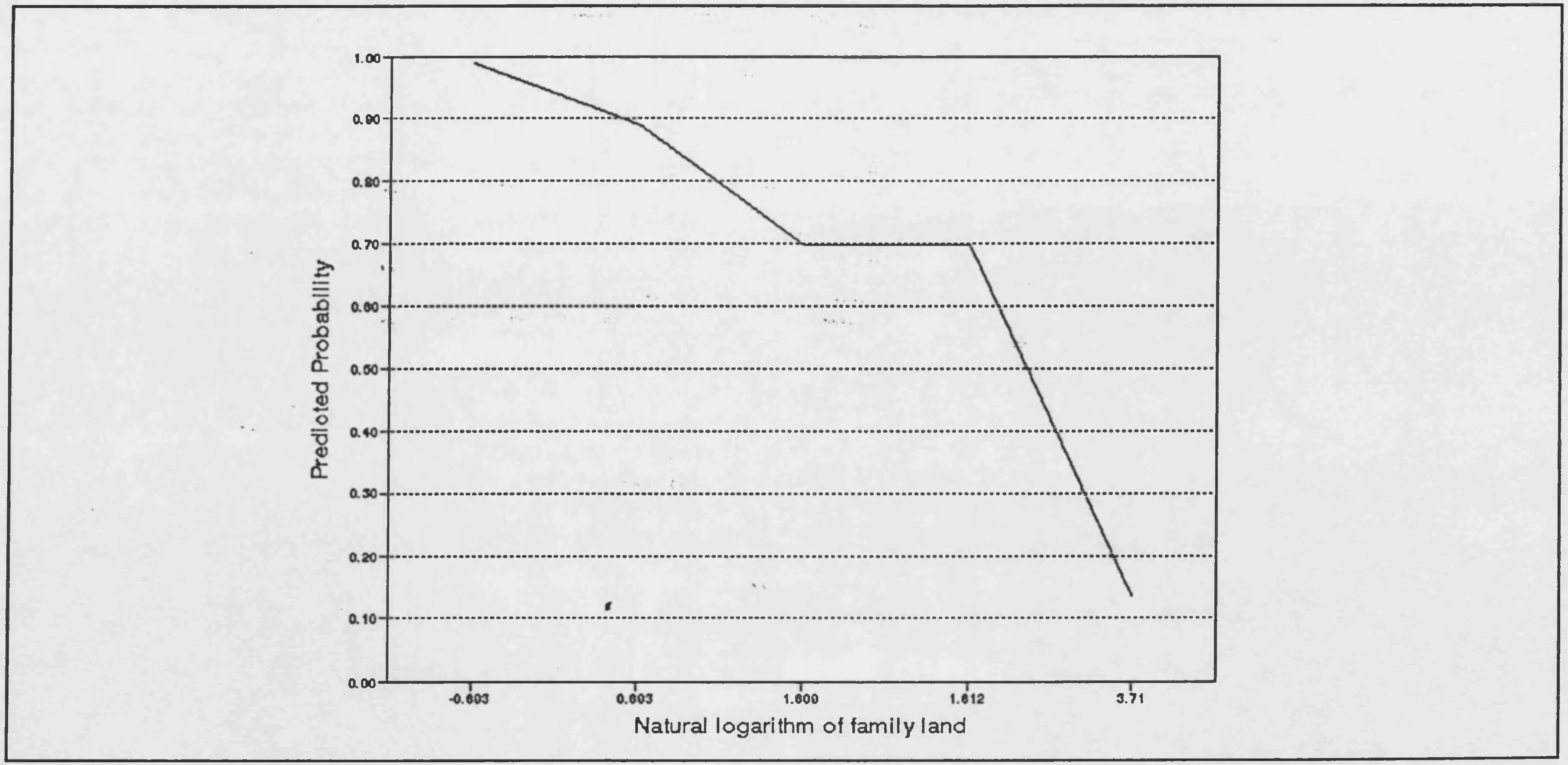

Figure 2. Distribution of predicted probability of choosing a regular contract according to family landholding (acres).

CHAPTER 7. CASUAL AND REGULAR CONTRACTS : CHANGING PATTERN IN RURAL INDIA

Introduction

In recent years, there has been a declining incidence of regular farm contracts in the study villages. Walker and Ryan (1990) have noted that '....the market for RFSs (regular farm servants) has tightened in all the villages..... Farmers increasingly complain that they are no longer able to hire good quality permanent help'. This is, however, not an isolated phenomenon in the study villages only. The same trend has been observed in some other regions of India as well. For example, Bardhan (1984a) has observed there has been a slackening of feudal obligations in labour-tying in the villages of Bengal. Reddy (1985) has found a declining incidence of the 'saldari' (regular) employment in some villages in Gujrat. Ramachandran (1990) also finds a disintegration of regular contracts in Tamilnadu. Large-scale studies like the National Sample Survey in India report that there has been an increasing casualisation of the rural labour force in most states in India. However, there are a few studies like Bhalla (1976) and Agarwal (1981) who have observed a rising incidence of regular farm labourers in certain tasks like irrigation or ploughing in the prosperous and technically advanced villages of Punjab and Haryana.

A common feature of all four theoretical models in chapter two is that the wages to be paid to regular labour is an increasing function of the casual wages earned from alternative employment opportunities. Therefore, an improvement in alternative employment opportunities[1] suggests a declining incidence of regular contracts, causing a leftward shift in the supply of regular labour. In the light of this proposition, this chapter examines the consequences of the growth of alternative employment opportunities on the incidence of regular contracts.

The chapter is developed as follows. Section 7.1 discusses the general trend in the changing pattern of rural employment while section 7.2 analyses this trend in the rural credit markets in India as well as in the study villages. Section 7.3 considers the evolution of regular farm contracts, related to the changes in employment and credit opportunities, and

[1]Alternative opportunities may refer to the availability of non-farm/governmental employment opportunities as well as the availability of cheaper credit which would encompass labourers to get into various self-employment schemes.

the alternative contractual arrangements introduced as a response to the declining incidence of regular jobs. In this respect, an inter-village variation is observed; the degree of casualisation of labour is higher in the more prosperous villages. In view of this variation, the analysis in section 7.4 examines the relationship between economic prosperity and the incidence of regular contracts in a village economy. The chapter ends with a brief summary of our findings.

7.1. Evolution of Rural Labour Markets

This section analyses the composition and evolution of rural employment in India. The discussion is divided into two sub-sections; the first sub-section focuses on All-India trends while the second one looks at the trends observed in the study villages.

7.1.1. Changing Composition in India

According to the 32nd round (1977-78) National Sample Survey (NSS), the total number of main and marginal workers in rural India (including the chronically unemployed) is around 239 million. The size of the labour force in terms of usual status was around 201 million of which around 69% were male. More than 60% of both male and female workers were self-employed or employed in family enterprises, with the rest being wage labourers.

Different rounds of National Sample Survey (NSS) data in India report the changing composition of rural employment in India which is shown in table 1.1. Between 1972-73 and 1977-78, there has been a declining trend in regular employment coupled with an increase in casual employment. However, self-employment continues to hold out the best prospect of employment in rural India over the years, though its contribution has diminished. In 1977-78, 41.2% of total rural labour was supplied by family labour, 6.1% by regular labour and 15.3% by casual labour (Source : Sarvekshana (NSS), 1981). The relative contribution of females in casual employment is higher than that in regular employment. Between 1977-78 and 1983, the contribution of the casual and regular components of employment has gone up while that of self-employment has continued to fall.

Secondly, using NSS data, the sectoral distribution of main and marginal workers in rural India is considered. This is shown in table 1.1'. Agriculture contributes most to the generation of rural employment; next in importance come mining, manufacturing, wholesale and retail trade and community, social and personal services.

Thirdly, the sectoral distribution of rural workers between 1977-78 and 1983 is considered. Female employment in agriculture is found to increase while that of males declines during this period. However, male employment in non-agricultural sectors like mining, manufacturing, construction, trade, transport and other service sectors has increased while the proportion relating to female labourers in these sectors has declined. The transition from agricultural to non-agricultural employment, especially for male labourers, marks a critical point in formulating rural employment policy.

Next, the Census data relating to the sectoral distribution of rural male workers in different states of India is studied (table 1.1"). This reveals that the proportion of male agricultural labourers in the male labour force has declined. However, male non-farm rural employment has gone up. Thus, both NSS and Census data indicate that gradually agriculture has become unable to absorb the fresh entrants in the labour force. Census data indicates that a part of the growing rural labour force has been absorbed by the manufacturing sector (table 1.1") while NSS data (table 1.1') shows that a part has been absorbed in the service sector.

7.1.1.1. Government Intervention

With the increasing population pressure on land, the adequacy of land reform measures to solve the problem of poverty has been questioned. Consequently, in the seventies the government undertook a series of different programmes to improve the plight of the poorer and weaker sections of rural society; these programmes include the following.

(i) Programmes oriented towards individual beneficiaries like Small Farmers Development Agencies (SFDA) and Marginal Farmers' Association (MFAL) which were subsequently supplemented by the Integrated Rural Development Programmes (IRDP) for overall development of the rural community;

(ii) Programmes for additional wage employment opportunities such as the Crash Scheme for Rural Employment (CSRE), Pilot Intensive Rural Employment Programme (PIREP) and the Food for Work Programme (FWP);

(iii) Programmes for the development of the ecologically disadvantaged areas such as the Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP);

(iv) Minimum Needs Programme aimed at increasing the level of living through a greater provision of basic social consumption and rural infrastructure.

In 1983-84, Landless Employment Guarantee Programme was initiated to provide employment of upto 100 days a year to at least one member of every landless household in the villages. Besides a number of state governments have special programmes for the benefit of the poor; in this respect, special mention should be made of Maharashtra Employment Guarantee Scheme (MEGS).

Labour-intensive rural public works programmes, aimed at generating additional wage employment, have emerged as an important instrument to alleviate the problems of unemployment in rural India. Consequently, the need for public works programmes has been assuming a growing importance in recent years. However, there has been inter-state variation in the availability of employment generated through public works programmes in India as shown in table 1.1.1. The percentage of casual labour in public works programmes is high in states like Himachal Pradesh and Jammu and Kashmir, moderate in Madhya Pradesh, Maharashtra, Punjab and Haryana, and low in Gujrat, Kerala, Orissa and Andhra Pradesh. Moreover, there is distinct discrimination between male and female involvement in rural public works. With the exception of Assam, female involvement is lower than that of males in all other states.

Rapid expansion of public sector activity in rural areas has led to a steep rise in the number of people employed in rural areas directly by the state governments. Moreover, different development strategies including the anti-poverty programmes generate further incomes among their participants. Thus, rapid expansion of public investment in rural areas is a new and growing source of income and employment which may further generate successive rounds of increases in the demand for several non-agricultural products and services.

Depending on its nature and size, rural public works programmes may generate a series of direct and indirect employment and income effects which accrue to poorer workers through construction, productive utilisation and regular maintenance of the infrastructure. Donovan (1973) reports that project construction in Karanataka generated additional employment of at least 18% of the total labour force drawn from seven villages, enhancing their incomes by an average of 108%. The role of Maharashtra Employment Guarantee Scheme (MEGS) is also noteworthy in this respect. Costa (1978) finds that in a sample of projects under MEGS, 70.6% of total expenditure on soil conservation works and 54.3% of expenditure incurred on road works have accrued to landless labourers as wages. Finally, mention may be made of employment and income benefits arising out of the Pilot Intensive Rural Employment Project (PIREP). Workers' wages constituted 78% of the total expenditure under PIREP in 1972-73 and 91% in 1973-74.

Thus, employment prospects in the non-agricultural sectors have been assuming a greater importance in rural India, especially among rural male labourers. NSS data reports the per cent change in non-agricultural employment for male labourers in rural India between 1972-73 and 1977-78. During this period, the proportion of male non-agricultural employment has increased in Andhra Pradesh, Punjab, Haryana, Jammu and Kashmir, Rajasthan, Tamilnadu, Uttar Pradesh (U.P.) and West Bengal while it has decreased only in Assam, Bihar and Gujrat.

The attraction of non-agricultural employment as against agricultural employment is closely related to the prevalence of higher non-agricultural wages in different parts of India. This is also supported by NSS data. NSS data reports daily agricultural and non-agricultural wages among different states in 1974-75 and in 1977-78 as shown in table 1.1.1'. Both agricultural and non-agricultural wages were higher in Punjab, Haryana and Kerala compared to those in other states. In 1974-75, agricultural wages were higher than non-agricultural wages in Assam, Kerala, Orissa, Punjab, Tamil Nadu and West Bengal. However, within four years, non-agricultural wages grew so fast that in 1977-78, non-agricultural wages were higher in all the states. In other words, by 1977-78, non-agricultural jobs were more rewarding than agricultural ones in most states in India.

7.1.2. Changing Composition in the Study Villages

Having discussed the general trend in different parts of India, in this section we shall consider the changing composition of the rural labour market in the study villages. To this end, two sets of data are used. The first one relates to the initial village studies data at ICRISAT over a ten-year (1975-84) period while the second one is part of the ICRISAT's latest resurvey data collected from the study villages in 1989. We compare the employment status (according to the main occupation) of the members of sample households in the age group six to sixty. This is shown in table 1.2.

The proportion of employment generated from self-employment has increased between 1975-84 and 1989 in Aurepalle and Shirapur. In Kanzara, however, the percentage has declined from 51% to 27%[2]. The importance of casual jobs is still higher than that of regular jobs in the study villages. The contribution of regular employment has declined in all the villages uniformly. This declining trend has been coupled with an increase in casual employment in Kanzara; in Aurepalle, the proportion of casual employment has remained

[2]It needs to be mentioned here that Kanzara has experienced a significant increase in the number of individuals going to school or college; between 1975-84 and 1989 the proportion increased from 14% to 30%.

unchanged while it has decreased in Shirapur. However, in Aurepalle and Shirapur, a significant rise in the incidence of self-employment (which includes tenancy as well) has been observed.

7.1.2.1. An Inter-village Comparison

Though all the study villages are situated in the semi-arid tropics of India, they differ widely in agronomic characteristics, which, in turn, determine the alternative job prospects available in these villages. Apart from agricultural activities in Kanzara, a substantial portion of labour income is earned from non-agricultural activities as well. Non-agricultural work can be divided into two categories :

(a) Non-agricultural work offered by households residing in the village which includes construction of houses, wells etc. where wages are usually paid on a piece-rate basis.

(b) Government projects which also generate substantial demand for unskilled labour. Several construction projects financed by the State Government are being conducted within walking distance of the village. The construction of percolation tanks during 1980 in Kanzara was intended to increase groundwater and was initiated as a publicly-operated relief project. At present, a canal is under construction and draws a significant amount of labour from Kanzara.

Both (a) and (b) generate alternative employment opportunities for agricultural labourers as well as for small farmers. Labour for the Government project is organised by a contractor (Mukkadam). Mukkadam organises labour from his own village. He is paid twice the daily wage for organising and supervising a gang of 30 to 50 labourers.

In Shirapur agricultural labour demand is seasonal. On the most fertile soil, only one crop is grown on residual moisture in the post-monsoon season. Irrigation amounts to only 10% of the total cropped area. Consequently, prospects of farm employment are not bright in the village. To some extent, this is compensated for by the non-agricultural labour demand for unskilled or semi-skilled labour generated by the Sholapur textile industry. As in Kanzara, here too the initiation of government projects is another source of non-agricultural labour demand. This includes construction of percolation tanks to increase groundwater availability as well as the construction of a canal within walking distance of the village.

The role of MEGS is noteworthy in successfully creating labour-intensive rural employment in rural Maharashtra. In the 1980s, MEGS has gradually transformed itself from a slack season work programme to a regular employment programme. Walker and Ryan (1990) have reported that the participation in the MEGS is significantly and inversely related to the value of family wealth of the participants, more so for women participants in Shirapur and Kanzara. Between 1979-80 and 1983-84, work in government-sponsored public work projects accounted for about 19% and 14% of men's wage employment in Shirapur and Kanzara respectively; corresponding figures for female labourers were 25% and 6%.

Agriculture is the main economic activity in Aurepalle. Compared to Kanzara or Shirapur, the availability of non-agricultural employment is scarce in Aurepalle. The village does not have many alternative employment opportunities as generated from factory work or government projects. Among non-farm activities well-digging, well-deepening or bore-well work offers some prospects of employment, but this is not a significant and steady source of employment. In order to supplement farm income, some households practise their caste occupations like toddy-tapping (Gowda caste) or sheep-grazing (Kurma), stone-cutting (Vaddera), weaving (Padmasale), supplying meat to Hyderabad (Muslims) etc. as subsidiary occupations. Occasionally some labourers migrate (usually temporarily) to Hyderabad for rickshaw-pulling[3]. Thus, labourers in Aurepalle are penalized because of the lack of labour demand from non-farm activities. This is further aggravated by the strong caste-based segregation of the village population[4] and the greater social and economic power of the higher caste farmers in the village. In other words, compared to Shirapur or Kanzara, Aurepalle continues to suffer from the scarcity of labour demand from non-farm activities during the study period.

One of the best indicators of the employment opportunities available in a region is the prevailing rate of involuntary unemployment. During 1975-84, the mean village unemployment estimates by sex has a moderate, but statistically-significant declining trend for both men and women in Aurepalle and Kanzara. When the inter-village disparities in unemployment rates are considered, the picture does not seem to have changed during this period. Kanzara remained the most prosperous and Shirapur, in spite of substantial non-farm employment, suffers from the highest rate of unemployment.

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[3]This supports the view that '.. circulation as a form of migration is more a symptom of persistent maladjustments in the system rather than an equilibrating mechanism smoothing out labour market disparities in spatially separated markets' (Mukhopadhyay, 1987).

[4]Participation in the regular market in Aurepalle is found to come primarily from the two Harijan communities - Madigas and Malas who have not been successful in improving their plight substantially and, thus, are not left with many alternatives.

7.2. Evolution of Rural Credit Markets

Rural credit markets in India are divided between formal sectors (comprising government, cooperative society/banks, commercial banks, insurance companies) and informal ones (comprising landlords, agricultural moneylenders, professional moneylenders, traders, friends/relatives, etc). While formal credit is cheaper than informal credit in terms of the cost of borrowing (also see chapter four), the advantage with informal credit is that in many cases it does not require any collateral as opposed to formal credit. The discussion, in this section, focuses on the changing composition of formal and informal credit in rural India with particular reference to the study villages in the eighties; the aim is to examine whether the credit constraints operating on the rural poor have slackened in the eighties.

7.2.1. Changing Composition in India

In order to assess the changing composition of rural credit markets in the eighties, we have primarily used the report of the All-India Debt and Investment Survey (AIDIS) conducted during the calendar year 1982 (RBI bulletin, 1986). The survey distinguished rural households between cultivator and non-cultivators. While the average value of assets for a cultivator household was Rs. 44,524 that of a non-cultivator household was Rs. 8,974. The average value of total assets per rural household increased more than three-fold in absolute terms from, Rs. 11,311 in 1971 to Rs 36,090 in 1981. After adjusting for the price rise, the estimated value of the real rate of growth of total assets during the decade is estimated to be 4% per annum.

However, there are inter-state differences in the growth of real assets. The average value of total assets per household was the highest in Punjab, followed by Haryana, Kerala, Himachal Pradesh and Jammu and Kashmir. In the second group of medium average values of total assets, there are Uttar Pradesh, Rajasthan, Gujrat and Maharashtra; low average value of total assets were observed in Andhra Pradesh, Assam, West Bengal and Tamil Nadu.

Finally, we consider the distribution of credit by the credit agencies. Debt owed by rural households indicated that the formal sector contributed to 61% of the cash debt of rural households in 1981 as against 29% in 1971 where the share of commercial banks was 28% in 1981 as against only 2% in 1971; debt owed to the cooperatives accounted for 29% in 1981 as against 20% in 1971. However, the share of debt owed to the government declined from 7% in 1971 to 4% in 1981. Debt owed to the informal agencies declined to 39% in 1981 compared to 71% in 1971; the decline was consistent for each type of informal credit agency. In particular, the share of debt owed to the moneylenders (agricultural and professional) declined sharply from 37% in 1971 to 17% in 1981. However, informal agencies continued to play a predominant role; the share of total debt owed to the informal agencies by the non-cultivator households declined from 89% in 1971 to 63% in 1981.

Thus, between 1971 and 1981, there was a pronounced extension of the formal credit network in rural India, though the extent is smaller for the non-cultivator households. In other words, AIDIS data suggests that even in the eighties, the credit constraint on the rural non-cultivator class, i.e. the landless households, was still operative, with the extent varying from one state to another.

7.2.2. Changing Composition in the Study Villages

According to sources as well as purposes, outstanding debt/credit details of the sample households is obtained from the VLS-P schedule (see chapter three). According to the source, values of these items are classified into two categories : (i) Amounts lent to or borrowed from the formal credit market, namely, the government (local or state), co-operatives, commercial banks etc.[5]; (ii) amounts lent to or borrowed from the informal credit market, namely, village moneylenders, friends, relatives etc. On this basis, the proportion of households having access to formal credit agencies are calculated for two periods : (a) the first phase of ICRISAT study during 1975-79 and (b) the second phase of ICRISAT study during 1980-84 which is shown in table 2.2.

In general, the extent of the spread of formal credit was much higher in the Maharashtra villages compared to the Andhra village, Aurepalle. It follows that by the mid eighties, a substantial portion of households belonging to the small, medium and large landholding classes had access to formal credit in these villages. However, labour households in Aurepalle and Kanzara continued to be excluded from formal credit. The situation was different in Shirapur where a substantial proportion of rural households continued to receive formal credit. To some extent, this can be attributed to the Drought-Prone Area Programme of the government of India which was operative in the village.

In other words, landless households in Aurepalle, as compared to those in Kanzara, not only suffer from a lack of job opportunities (section 7.1.2), but also from a lack of credit availability (also see chapter four). Shirapur, however, appears to be different from the other

[5]Shirapur, being situated in the drought-prone area, has access to special credit advanced by the government of India under the Drought Prone Area Programme (DPAP).

two villages. Rural households in Shirapur have substantial non-farm job opportunities; they also have access to formal credit at a cheaper rate. However, due to the drought-prone nature of the area, the risk of agricultural production is much higher so that the market for farm labour often suffers from a lack of demand.

7.3. Evolution of Rural Labour Contracts

Historically, hiring attached regular labourers is primarily confined to wealthy and large farmers in the villages. Attached labour contracts have traditionally been viewed as patron-client relationships, with the patron being the master or landlord or employer (the dominant partner of the contract)[6]. There has been a large literature contributed by scholars from different disciplines - historians, social anthropologists, economists in different parts of the world (see Breman (1974), Epstein, (1962, 1967), Geertz (1970), Hayami and Kikuchi (1981), Hart (1986), Scott (1976), Bourdieu (1980) and Alexander (1982)). A wide variety of patron-client relationships has been observed over time and space with varying degrees of dependence and dominance in the relationship.

For example, there are cases of obligatory services rendered by the tenant-serf to the lord of the manor in eighteenth-century European feudal society or different kinds of debt-bondage to the landlord-moneylender in different parts of Asia or Africa. In this respect, the case of the Indian caste system, locally known as 'jajmani' (Lal, 1988)[7], may also be cited where the economic interdependence and labour division are organized through a network of personal hereditary relationships between the patron and clients (performing specialised, caste-based functions). The fact that labour relations are based on hereditary ties has further reinforced the solidarity between masters (patrons) and servants (clients) and thus prevented the latter from revolting against the dominant castes.

However, with the erosion of feudalism, the growth of commodity economy in agriculture and the emergence of industrialised society giving rise to non-agricultural employment opportunities, there has been an evolution of this patron-client relationship all

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[6]In the literature, two types of relationship between the patrons have been identified - (i) competing patronage and (ii) aristocratic patronage. We observe that the anthropological literature (for example, Scott, Bourdieu) extensively documented the fact that the control over a clientele is viewed by the patrons as an important means of achieving economic wealth, social prestige, and political power in the village. However, the second kind of patronage puts emphasis on the fact that the relations among the patrons are largely governed by a code of honour and gentlemanly manners forcing them to cooperate in various matters, including the aspect of labour relations.

[7]Lal (1988) has offered a risk-sharing explanation. He infers that the bigger landlords (who are risk-neutral) would be able to bear the income variability of tropical agriculture by offering a uniform wage to the risk-averse workers throughout the year.

over the world. We shall, in this section, focus on the decline of regular contracts in India with special reference to the study villages.

7.3.1. Decline of Regular Contracts in India

With the erosion of economic and political power of landlords through the implementation of different land-reform measures in the post-independence period, the growth of alternative non-farm employment opportunities and government intervention in the rural labour and credit markets, the patron-client relationship is changing in different parts of India. Though the exact circumstances may vary from one region to another, long-term labour contracts are, at present, observed to be instances of voluntary labour-tying.

Two specific trends have been observed in this regard. The most prominent and widespread one is the declining incidence of regular farm contracts in most villages in India. This can either be caused by the individual labourer's reluctance to participate in regular jobs. Alternatively, this can be caused by the farmer's reluctance to take on customary obligations to negotiate regular farm contracts[8].

Secondly, Bhalla (1976) while studying the Green Revolution period in Haryana, finds that with rising real wages rates in these agriculturally advanced villages, there are shifts in the contractual mix towards longer-term contracts for men. Agarwal (1981), too, finds that there has been an increasing incidence of regular farm contracts in certain tasks like irrigation among the large farmers in the prosperous villages of Punjab.

Bardhan (1984a) argues that yield-increasing improvements increase the importance of tied labour as a proportion of total labour hired. The observation also fits well into our 'hoarding cost' argument. In agriculturally prosperous villages of Punjab, there is year-round demand for labour. Thus, the employment of regular labour not only minimises wage costs[9] (and wage fluctuations), especially when there is upward pressure on daily wages, but also minimises the hoarding costs of regular labour in the prosperous irrigated agriculture.

7.3.2. Decline of Regular Contracts in the Study Villages

The institution of regular farm contracts, as prevalent in the study villages does not,

[8]See further discussion in section 7.3.3.2.

[9]This holds good because usually daily regular wages are lower than daily casual wages (also see chapter four).

in any way, resemble the serfdom of feudal society. The labourer is free to choose his/her employer; if s/he is not satisfied working with the current employer, s/he is also free to leave him once the contract period is over. The relationship between the employer and the labourer is formal and does not usually extend beyond work related to the farm. The contract commonly lasts for about a year; afterwards it can be renewed provided both parties agree. This is no longer a case of hereditary labour-tying (also see Bardhan (1984a), Reddy (1985), Walker and Ryan (1990)).

The analysis in chapter five shows that large farmers are more likely to hire regular farm servants because they have a greater demand for labour throughout the year such that hoarding costs are minimum. In chapter six of the dissertation, it is shown that the choice of regular contracts is particularly advantageous for landless labourers; a regular contract ensures the security of employment as well as that of credit. Moreover, the choice is consistent with their time constraint. In some cases, other members of the regular farm servant's family also work for the same employer, usually in exchange for cash or kind payment in kind. Elements of extra-economic coercion are not very apparent here.

With the growth of alternative employment opportunities, the extent of unemployment is declining among male and female casual labourers in the study villages, especially in Aurepalle and Kanzara (Walker & Ryan, pp.132, 1990). In addition, due to government intervention, credit is made available to landless labourers; slack period employment opportunities have also been created in some villages. Consequently, the incentive of employment and credit security associated with regular farm contract is losing its significance. However, an inter-village variation is observed. Employment and credit constraints are more binding for the labourers in Aurepalle as compared to Kanzara. This perhaps explains why the incidence of regular contracts is higher in Aurepalle (further see our discussion in section 7.4).

In comparison, the case of Shirapur is different. As already discussed, Shirapur has substantial non-farm employment opportunities. However, due to the drought-prone nature of the village (i.e., higher risk of farming), prospect of farm employment is rather bleak (which is reflected in the rate of unemployment). On the other hand, compared to Aurepalle and Kanzara, availability of formal credit is easier, even to the landless labourers. This may well be the main reason why the incidence of regular farm contracts is the least in Shirapur.

However, farmers are increasingly complaining about the non-availability of reliable and efficient regular farm servants. Nowadays, rural labourers are reluctant to participate in the regular market. The situation indicates a downward shift in the supply of regular labourers, with demand remaining unchanged. The obvious consequence has been a declining incidence of regular farm contracts in these villages.

7.3.3. A Trend towards Casualisation

With the decline of regular contracts, there has been a change in the land-labour arrangements all over India which has marked a trend towards a gradual casualisation of the labour force.

7.3.3.1. Labour Contracts in the Study Villages

Increasingly, rural labourers in the study villages are reluctant to negotiate regular contracts. Nowadays, the entrants to the regular labour market are primarily landless labourers with pressing credit needs. Confronted with the supply constraint, farmers are forced to adopt alternative arrangements to meet their labour requirements.

Piece-rate contracts as opposed to daily casual contracts are increasingly popular in all the study villages, especially in operations like transplanting and weeding where quality control is not so important. Sometimes a piece-rate contract is given to a group as well; it is then called a group contract. Usually, groups of women labourers headed by a leader (who is also a woman) are hired to perform different operations on a contract basis. Given the nature of the contract, the farmer does not have to supervise them closely and the work is done in time.

Another form of group contract has nowadays been found in Aurepalle. This is locally known as *'Arakapollu'* (group tenancy) where two to three persons owning bullocks lease-in land for a year and they cultivate land together. Sometimes, the landlord also participates in the group. The contract may be on a fixed-rent basis or on a share-cropping basis. Mueller and Townsend (1993) find that the contract is on a share-cropping basis when the landlord participates; otherwise it is a fixed-rent contract. In most instances of share-cropping, the share is fixed at 50%. The rest of the net profit is distributed among the group members, including the landlord (if participating) according to the contribution of the labour (bullock as well as human labour) in the production process. Fixed-rent contracts specify the exact amount of the rent to be paid (in kind) to the landlord for the use of land. The landlord does not bear any input costs. In this case, too, the tenant members of the group divide the net profits according to the share of the cost borne by them.

To some extent, the group contract eliminates the imperfection in the market for bullocks. In the absence of the rental market for bullocks, it is imperative for the landlord to arrange bullocks for cultivation where this form of group tenancy becomes convenient. Secondly, the need for supervising labourers on land is minimum here because the tenant members are made the claimants of the residual profit and because of their joint responsibility they supervise each other as well. Thirdly, the formation of these groups facilitates the access to credit. In some cases, they receive required funding from the participating/non-participating landlords. In other cases, they pool their own funds to meet the required expenses. In still other cases, expenses are partly financed by the landlord and partly from their own resources. Finally, the arrangement has the benefit of pure tenancy; it helps the landlord to share the risk of crop production with the tenants which may be significant in this semi-arid tropical area.

With the tightening of the regular market, a particular form of share-cropping contract called *'Angwata'* has been popular in Shirapur. In the drought-prone area of Shirapur, only a few farmers nowadays can afford more than one regular farm servant. Instead, they prefer share-cropping where the risk of production is shared with the tenant. Usually, the landowner provides the bullocks for cultivation and the labourer works as the operator. Output is shared between the landlord and the tenant; the rate varies according to whether the land is irrigated or not. This contract is usually given for a single production period by the end of which the contract can be renewed so that the tenant cannot claim the ownership right on land. Some households who served as regular farm servants for years are now tenants or share-croppers. But 'it is found that, on an average, total earnings of the share-cropper households are equal to or less than the income he would have earned as an RFS[10]'. Labourers prefer it since they are in a position to take farming decisions independently and they are free to do other work as well. Farmers, too, find it convenient because they do not need to supervise labour closely for day to day operations; the latter holds good, because the share-cropper has his/her own incentive to work hard as s/he is the claimant of the residual profit. In addition, the risk of production is shared with the tenant.

7.3.3.2. Labour Contracts in Other Parts of India

With the tightening of the regular labour market, farmers in different parts of India have adopted various alternatives. This distinctly shows a trend towards casualisation of the rural labour force. For example, Krishnamurty (1984) and Vaidyanathan (1986) have used

[10]Bhende, M.J. and Ladole, V.B. 'Labour Market Survey', tour Report, ICRISAT.

NSS data to show that there has been an increase in the share of casual labour in total labour. In addition, a number of micro-level village studies conducted in different parts of India (Breman, 1974; Reddy, 1985; Walker and Ryan, 1990) also find evidence towards a casualisation of the rural labour.

Krishnamurty (1984) uses 27th and 32nd round National Sample Survey data. Table 3.2.2. is borrowed from him. This shows the extent of casualisation, i.e., the per cent share of casual labour in the rural work force. There has been an increase in the share of employment of casual labour relative to total employment. In this respect, an inter-state variation is observed. During the years 1972-73 and 1977-78, the degree of casualisation of male labourers in most states in India was observed to go up with Kerala and Maharashtra being exceptions. However, on an average, a higher proportion of casual labourers continues to prevail in both Kerala and Maharashtra in 1977-78. The scenario is found to be very similar for female casual labourers as well, where the degree of casualisation is on the increase in most states except Kerala, Maharashtra and West Bengal.

Next, we consider some micro-level village studies conducted in other parts of India in order to compare them with the trends prevailing in the study villages. Breman (1974) has studied the disintegration of the 'Hali' system (attached farm contracts) in the villages of south Gujrat. According to him, this was a gradual change which perhaps started some time in the beginning of the twentieth century[11]. Breman argued that during this time, due to a large increase in wages, the amount to be paid by the master to the hali had increased substantially; at the same time with the growth of urban centres around these villages, the risk of the hali running away was also greater. Moreover, due to the continuous subdivision of land, the financial capacity of the landlords was affected adversely. In addition, with the changing in the cropping system, landlords did not need to use much regular labour and could, instead, continue their operations with short-term labour.

Reddy (1985) has considered the evolution of labour contracts in a number of villages in the Amaravati district of Gujrat. Regular farm servants in Amaravati are commonly known as 'saldars'. In the old days, a loan taken from the employer was the beginning of lifelong employment in the most servile condition when the prestige of the landlord depended not only on the amount of landholdings or bullocks, but also on the number of regular farm servants (competing patronage). However, by the beginning of the century, the form of the regular contract started changing when regular farm servants were

[11] According to Joshi (1966), it started after the First World War while according to Desai (1965) it started a bit later, some time during 1940-60.

being employed just for a year; the contract could be renewed at the end of the year. In the post-independence period, employers in Amaravati started hiring labourers on a monthly basis; the number of farm servants fluctuated with the need for labour, being higher in the peak agricultural seasons.

With the decline of saldari employment, the incidence of monthly labour contracts has gone up correspondingly. Usually, the monthly labour contracts are renewed each month and wages are wholly paid in cash. Even under the monthly contract system, some labourers are able to gain employment for the whole year, but a majority of them are without any job for three to four months a year.

In some cases, traditional regular relations between the employer and the labourer has taken the form of the employment of 'Ghaddis'. A Ghaddi works as a daily labourer, but on a regular basis, sometimes continuing for the whole year. Ghaddis work for longer hours a day, though for a slightly higher daily wage than a daily labourer and they do the work of a saldar. However, unlike saldars, Ghaddis do not usually obtain any additional customary gifts or bonus from the employer.

Ramachandran (1990), too, analyses the causes of the disintegration of regular farm contracts in some villages in Tamilnadu. He argues that there are two sets of factors that lead to the declining incidence of regular contracts. One is the growth of the commodity economy in agriculture, intensive farming for profit and large-scale employment of hired labour to ensure high productivity. The second is the spread of modernity, penetration of the civil society into the village, workers' unionisation and the opportunity for migration.

Our analysis in this section suggests that it is not only the landlords, but also the farm servants, who are responsible for a gradual change in the system of regular contracts. However, the relative strength of each party is not so obvious. In the study villages, however, there is strong evidence of a decline in the supply of regular labour. In fact, most studies (e.g., Reddy, Ramachandran, Walker and Ryan) find that the decline of regular contracts is closely related to the leftward shift in the supply of labour.

7.3.4. Causes of the Decline of the Supply of Regular Labour

In view of our analysis in the preceding sections, let us now summarise the factors leading to the declining supply of regular labour in rural India. These are as follows:

(i) ***Alleviation of Employment Constraint*** : As already discussed in section 7.1, this may take the following forms:

(a) *Brighter prospects of Farm Employment* : As farm investment is becoming more profitable, and as tenant protection legislation is being implemented, landowners are resorting to own farming with hired labour instead of leasing out land. Increasing operational concentration of land and the intensification of farming for profit have increased the proportion of hired to total farm labour input. Secondly, under the impetus of technological factors, the nature of the traditional village economy has gradually been changing. Until very recently most farmers used to produce a single crop in the year. This is no longer the case. We cannot identify a single slack period (when the demand for labour is lower) followed by a peak period (when labour demand goes up). With the adoption of multiple cropping (due to the availability of steady irrigation facilities throughout the year) and the commercialisation of agriculture, there is a year-round demand for farm labour. This is especially true in the areas of irrigated agriculture where inter-village variation is observed. Compared to rainfall-assured Kanzara, the demand for farm labour is lower in both Aurepalle and Shirapur.

(b) Availability of *non-farm employment opportunities* is assuming greater importance in rural India; non-farm jobs are considered better because of the higher wages offered (relative to farm employment). However, there is regional variation in this respect. Non-farm employment prospects are not bright in Aurepalle compared to Shirapur which has an advantageous location because of its proximity to the Sholapur textile industry.

(c) A variety of *rural development* (RD) programmes have been launched in India in recent years. Under these various programmes (e.g., IRDP, NREP etc; also see discussion in 7.1.1), central and state governments are taking an active interest towards generating supplementary wage employment, especially in the slack seasons, particularly for poor agricultural labourers and marginal farmers. The government is increasingly investing in various public works programmes like local irrigation projects and road development. These projects continue for a few years with an enormous impact on the local unskilled/semi-skilled labour markets. As already mentioned, Maharashtra Employment Guarantee Scheme (MEGS) has played a successful role in Shirapur and Kanzara as opposed to Aurepalle.

(ii) Alleviation of the Credit Constraint : We have already discussed in section 7.2 that in recent years there has been an expansion of formal credit network towards the poorest of the poor in the rural society. As part of different poverty alleviation programmes undertaken in different five-year plans in the seventies, a variety of subsidized credit schemes have been launched in rural India, especially directed to the needs of landless labourers to encourage various self-employment schemes. Under these schemes, many labourers receive subsidized loans to buy goats, sheep, buffaloes or bullocks.

Lack of non-farm labour demand in Aurepalle has, to some extent, been compensated for by several self-employment schemes. With the availability of cheaper credit, there has been an increasing opportunity to participate in self-employed subsidiary occupations like poultry, dairy farming, sheep grazing, toddy tapping, stone-cutting, etc. some of which are associated with caste-related occupations. For example, with rising goat and sheep prices, the shepherd community (Kurma) in Aurepalle prefer to concentrate more on their family business and participate even less in wage employment. The same story applies to the toddy-tappers (Gowdas) in Aurepalle. The traditional occupation of the Gowdas is toddy-tapping; with the rising prices (and increasing profitability) of toddy (palm juice), nowadays they devote more time and effort to tap toddy (palm). Very often, they invest the profit obtained from toddy-tapping to buy land and to start own cultivation; consequently, their market participation rates have declined. However, participation in caste-occupations like weaving, carpentry, black-smithy, pottery, livestock-rearing etc. is not very significant in the other two study villages, Shirapur or Kanzara.

In addition to the cheaper credit from the government, co-operatives and commercial banks offered to labourers in the Maharashtra villages, Shirapur has gained significantly from the DPAP programme of the government of India. Under the scheme, a substantial amount of low-cost credit has been made available to landless labourers. Consequently, unlike Aurepalle and Kanzara, the credit incentive attached to the regular farm contracts has lost much of its significance in the village. In addition to the higher risk of employing regular labourers in this drought-prone village, this may perhaps explain why the incidence of regular farm contracts is less than that in Aurepalle and Kanzara.

(iii) Evolving Ideology : With the government laying emphasis on education, the younger members of the farming households, especially those belonging to the families of medium and large farmers, do go to school regularly. Consequently, these younger members cannot offer their labour on the family farm on a full-time basis. The situation is often different in the labouring households, where the opportunity cost of time spent in school is very high.

Side by side, there has been a growing feeling of class consciousness in these villages. Regular labourers are increasingly conscious of their servitude and their lack of dignity. Instead of being attached to some farm as regular farm servants, even the poorer labourers, prefer to be their own boss (cultivating their own land, however small, or leasing in land and/or doing some other casual work). Educated members of the cultivating households prefer to participate in rural white-collared jobs. A similar tendency has been observed by Rudra (1982a) among the agricultural labourers in the villages in West Bengal.

Presumably, this class consciousness has emerged partly as a result of a campaign against illiteracy at the state level as well as the penetration of urban values into the rural life (also see discussion in section 7.4.2).

7.4. Incidence of Regular Farm Contracts and Economic Prosperity of the Village Economy

This section examines the association between growing economic prosperity of rural India, and the easing of employment and credit constraints for agricultural labourers, especially the landless ones. It is argued that the declining incidence of regular labour contracts is directly related to the economic advancement and prosperity of the village economy. The argument is as follows: economic development in rural India usually goes hand in hand with the expansion of alternative employment opportunities for agricultural labourers, and with a greater access to credit. This, in turn, can be expected to lead to a lower incidence of labour-tying arrangements. Indeed, a common feature of each of the four theoretical models examined in chapter two is that the wage paid to regular labourers is an increasing function of their alternative employment opportunities. When these opportunities improve, the supply curve for regular labour shifts to the left, and the new equilibrium typically involves less employment of regular labourers and a higher real wage rate.

7.4.1. Economic Prosperity and Classification of the Study Villages

The availability of alternative employment opportunities depends on the economic prosperity of the village which, in turn, depends on the characteristics of the village economy. Using these characteristics, we classify the study villages according to the level of economic prosperity.

First we consider different socio-economic indicators at the state level as shown in table 4.1. Taken together, these indicators suggest that the state of Maharashtra (where Kanzara and Shirapur are situated) is more prosperous than Andhra Pradesh (where Aurepalle is situated).

Secondly, we consider the inter-village differences in agro-economic characteristics (see table 1.2.1 in chapter three). In Aurepalle, the population density is the highest while the literacy rate is the lowest. Here the average annual rainfall is lower than in Kanzara, though higher than that in Shirapur. Shirapur is situated in the drought-prone area of Maharashtra. Compared to Aurepalle, the proportion of total area irrigated is lower in Shirapur, giving rise to greater risk involved in farm production in this drought-prone village. The proportion of crop income in total income is 48% in Aurepalle while that in Shirapur is 34-46%. However, the proportion of labour income is higher in Shirapur (43%) than in Aurepalle (20%).

Finally, we compare the average net per capita household income during 1975-76 and 1977-78 among these study villages. The average net per capita income was Rs. 627 in Kanzara, Rs. 445 in Shirapur and Rs. 422 in Aurepalle at 1968-69 prices. The lack of agricultural and non-agricultural employment opportunities in Aurepalle is reflected in that it has the lowest household income among the study village closely followed by Shirapur; Kanzara, however, has a much higher per capita income. It is noteworthy that irrespective of greater variability in crop income, Shirapur has a greater average per capita household income than Aurepalle. This can be attributed to the better prospects of non-farm employment opportunities (including the government projects) prevalent in Shirapur.

On the basis of the above indicators, study villages are classified as advanced, intermediate and backward. Kanzara is certainly in an advantageous position, being situated in the more rainfall-assured zone of the semi-arid tropics which is reflected in its higher per capita income. Compared to both Aurepalle and Shirapur, Kanzara is economically more prosperous. Kanzara is, therefore, called the 'advanced' village. Shirapur is also situated in Maharashtra; but compared to Kanzara, it is located in a more drought-prone area, giving rise to a high variability in crop income. The third village, Aurepalle, situated in the semi-arid area of Andhra Pradesh also suffers frequently from fluctuating crop production (though irrigation facilities are better in Aurepalle relative to Shirapur,; see table 1.2.1 in chapter three). However, there is a crucial distinction between Aurepalle and Shirapur. The high variability of farm income in Shirapur is, to a large extent, compensated for by the availability of non-farm employment opportunities (including government jobs) to all groups of labourers. In addition to the positive impact of MEGS, the village has access to the unskilled labour market of the Sholapur textile industry. Secondly, the village comes under the Drought-Prone Area Programme (DPAP) and, as such, receives steady and substantial support from the central and the state governments. Moreover, it follows from our discussions in sections two and three of this chapter that compared to Kanzara and Shirapur, landless labourers in Aurepalle are worse off not only with respect to the availability of non-farm employment opportunities, but also with respect to that of credit. Accordingly, Shirapur is designated to be the 'intermediate' village and Aurepalle the 'backward' one.

7.4.2. Incidence of Regular Farm Contracts

In this section, we examine the association between the declining incidence of regular contracts and the growing economic well-being of a village. As an illustration, let us take the case of Aurepalle. Aurepalle is the most backward of the three study villages and it is the village with the highest incidence of regular farm servants. These are also found to be the poorest (in terms of wage and non-wage benefits) among all three study villages. The number of regular labourers hired by the sample households fluctuates over the period 1975-76 to 1984-85, but lies in the range of 23 to 26. In comparison, the number of regular labourers in Kanzara varies between 10 to 26 over this 10 year period (in most years it was around 17) while the number is as low as 2 to 5 in Shirapur. This is also reflected in the probability of hiring regular farm servants in the study villages[12]; while the probability is 0.33 in Aurepalle, it is 0.17 in Kanzara during the study period, i.e., 1980-84 (also see section 5.2 in chapter five). The probability comes to only 0.04 in Shirapur (see our explanation in sections 7.3.2 and 7.3.4). The average period of association as well as the degree of dependence on the employer is also higher in Aurepalle compared to Shirapur or Kanzara.

Thus, compared to Shirapur or Kanzara, the institution of regular farm contracts continues to be stronger in Aurepalle. According to our analysis, this can be attributed to greater employment and credit constraints operating on the landless labourers in this village compared to other study villages.

Next, we consider the trend in casualisation of the rural labour force in India. To this end, we use the reports of some large-scale surveys in India. As already mentioned, Vaidyanathan (1986) and Krishnamurty (1984) examine the general trend in an all-India perspective. Using their information, we calculate the per cent change in the growth of non-agricultural employment and that of the casual labour force as shown in table 4.2. Positive (+) and negative (-) signs in the table indicate the direction of change over the period under consideration. Using columns (i) and (ii) of table 4.2, the correlation coefficient between the growth of non-agricultural employment in different states of India and the corresponding rate of casualisation (% share of casual labour in total employment) for the period 1972-73 to

[12]As before, we calculate the probability of hiring regular farm servants in a particular village as the relative frequency; it is the ratio of the number of households hiring regular farm servants out of the total number of sample households considered in the village during the study period.

1977-78 is calculated. The correlation coefficient is found to be positive for both male and female labourers, though smaller for female labourers; it is 0.15 for male and 0.08 for female labourers. This means that with the growth of non-farm employment opportunities, there has been an increasing casualisation of the male and female rural labour force with the extent being greater for male labourers. In fact, it has been found that in many instances female labourers are denied the access to non-farm jobs.

The primary incentive of regular contracts in many parts of India still today is the credit security made available to the landless poor which is otherwise difficult to obtain. The analysis in section two of the chapter indicates that credit constraints operating on the rural poor have weakened in different parts of India in recent years, but its extent also varies among the villages situated in different states. In general, landless labourers are largely excluded from the access to formal credit in different parts of the country. We, however, are not aware of any study which identifies increasing credit availability as a factor in the disintegration of regular farm contracts in India.

7.4.3. Growth of Real Agricultural Wages

The final task is to relate the declining incidence of regular contracts with the growth of real wages. This enables us to separate out the effect of the supply factor relative to demand. As already discussed, under the pressure of lack of regular labour supply, regular wages have grown faster in the study villages. Between 1975-78 and 1981-84, both men and women's real casual wages have risen by about 60% in Aurepalle. During the same period, men's real wages rose by 41% in Shirapur while females' wages increased by 58%. In contrast, real wages in Kanzara grew at a much lower rate during this period; the corresponding figures were 11% for men and 19% for women (Walker & Ryan, 1990).

With the growing reluctance among labourers to take on regular farm servants' jobs, there has also been an upgrading of regular wages in all the study villages during the first half of the eighties. In Aurepalle, the mean monthly payment in paddy increased by 20% from 45 kg. in 1979 to 55 kg. in 1985. A similar trend has also been found in the Maharashtra villages; in Shirapur, the cash component of the regular wage doubled from Rs. 75 in 1979-80 to Rs. 150 in 1985-86 (though the payment in kind, in sorghum, remained unchanged). In Kanzara, the mean monthly salary rose from Rs. 110 in 1979-80 to Rs. 190 in 1985-86. It follows that, in the first half of eighties, the regular wage did increase in real terms, even if we allow for the rise in prices during this period (village consumer price index

(1975-76 = 100) rose to a level between 150 and 160 in the early eighties).

Evidence suggests that the pressure of demand relative to supply has led to an increase in the advance component of the remuneration given to regular farm servants. For example, '.... in the Akola villages from 1980-81 to 1982-83, seventy regular contracts were negotiated by the respondent household members, and of these 51% included advances averaging Rs. 313. The same households from 1983-84 to 1985-86 negotiated only 59 regular farm contracts, 73% of them involving advances averaging Rs. 520' (pp. 135, Walker and Ryan, 1990).

Secondly, we consider the growth in real agricultural wages (for male casual labourers) in different states of India during 1972-73 and 1977-78 as shown in table 4.2. It suggests that during this period real wage rates grew fast in most states in India. Next, we examine if there is a direct correlation between the rate of casualisation of the rural labour force and the rate of growth of real wages in different states in India. To this end, we calculate the correlation coefficient between the rate of casualisation (column ii of table 4.2) and the rate of growth of real (male) wages (column iii of table 4.2). The correlation coefficient for male labourers is estimated to be 0.59 and it is statistically significant, too.

The above analysis suggests that recent declining trend in the incidence of regular contracts is closely related to the growth of rural non-farm employment opportunities in different parts of India. Moreover, this declining incidence of regular contracts is generally accompanied by the growth of real wages not only in the study villages but also in different states of India. Taken together, available evidence reflects that the recent decline of regular contracts in India is caused by the leftward shift of the supply of labour so that real wages have increased (and *not decreased*).

7.4.4. Some Additional Considerations

Our analysis so far has emphasized the growth of alternative employment and credit prospects to explain the changing pattern of labour contracts in rural India. However, some additional factors may also be important in the determination of the nature of rural labour contracts.

One possible factor affecting the evolution of labour contracts is the *mechanization of agriculture*, started in the early sixties. Some studies highlight the effect of agricultural mechanization in the Indian states of Punjab and Haryana where the impact of mechanization (related to the successful green revolution) is most pronounced. Using a sample of 240 owner-cultivator farms drawn from the wheat-growing areas of Punjab in 1971-72, Agarwal (1981) examines the effect of mechanization on employment by agricultural operations. She finds that there are variations according to farm-size and the nature of agricultural operations.

Harvesting is the function which is still carried on by manual labour while threshing is highly mechanized for most farms in these villages. Both traditional and modern techniques are used in ploughing and sowing while irrigation is done largely by modern means. In ploughing, as farm size increases, the proportion of family labour time displaced decreases while that of permanent and casual labour time displaced increases. Similarly, in sowing, tractors tend to reduce requirements of family labour time on the smaller farms and of permanent labour time on the larger ones with some little increase in the use of casual labour time. Canal irrigation, however, leads to an increase in the use of labour time on farms of all sizes; on smaller farms it raises the use of family labour time while on larger farms it raises the use of permanent labour time. Mechanization is found to be labour-displacing in threshing; in this case, it displaces family and casual labour on smaller farms, and family and permanent labour on larger farms.

Agarwal's observations fit into Bardhan's (1984a) and Eswaran and Kotwal's (1985a) argument that labour-saving technical progress (e.g., as threshing) reduces the incidence of regular farm contracts while yield-increasing technical progress (e.g., irrigation) will increase the incidence of regular farm contracts. It appears that the study villages are the traditional ones which still follow labour-intensive techniques of production; the use of tractors, threshers and sprayers is extremely limited. Hence, the effect of mechanization has not yet been felt on the present form of labour contracts in these villages.

Secondly, *migration* may also play a crucial role in determining the nature and incidence of regular farm contracts, especially in view of the increasing inter-regional disparity in agricultural development in India. Migration offers an additional opportunity for labourers to change their working conditions and more to where wages are higher. Also, migrant labour enjoys a kind of anonymity; unlike the village his or her labour is not associated with his caste or family background. Thus, migration may be a way out of the village social hierarchy. However, as already discussed in chapter four, short-distance migration among the neighbouring villages is not very common in rural India. More common is long-distance migration.

There are some studies where the significance of migration is studied. For example, Oberoi and Singh (1980) have examined the case of migrant labourers, moving from U.P. to the villages in Punjab; Breman (1985) has studied the case of migrant labourers in the prosperous villages of south Gujrat (also see discussion in chapter four). None of them has studied the consequence of migration on the form of labour contracts. However, Ramachandran (1990) argues that the opportunity of migration from the village (Gokilapuram) in Tamilnadu to the cardamom estates in Kerala may contribute to the disintegration of labour services in Gokilapuram.

In the study villages, however, migration does not offer a viable employment opportunity for labourers[13]. Occasionally, some members of the household move to cities to earn a better livelihood; nevertheless, in view of the high costs of dislocation relative to the benefits, villagers do not usually consider migration to be an attractive option.

7.4.5. An Overview

To summarise, we emphasize that the declining incidence of regular labour contracts in India is not only related to the changing employment constraints, but also to the slackening credit constraints in rural India. Our analysis emphasizes the fact that this decline of regular labour contracts is due primarily to a shift to the left of the supply curve itself, due to better employment and credit opportunities, rather than to a shift to the left of the demand curve, reflecting an increasing reluctance on the part of the farmers to hire regular labourers (i.e., it is a 'pull' and not a 'push' effect). A possible manifestation of this effect is that the decline of regular contracts has gone hand in hand with an *increase* and *not a decrease* in real wages.

Secondly, we find that the greater the economic prosperity of a village, the lower is the extent of these constraints and the lower the incidence of regular farm contracts or, conversely, the higher is the casualisation of the labour force.

It appears that there is a contradiction between our findings and the belief that there has been a major impoverishment of agricultural labourers in rural India in recent years. Using NSS data, Kalpana Bardhan (1989) finds that between 1964-65 and 1974-75 (the period following the green revolution in India), the rural wage labour force with little/no land nearly doubled. By 1977-78, there were 62 million agricultural labourers while there were only about 100 million cultivating peasants. According to Bardhan this upsurge in the rural wage labour force has been the result of the following factors: (i) rapid population growth, (ii) agrarian structural changes (e.g., increasing operational concentration of land and the

[13]Among the study villages, there is some in-migration in Kanzara; but migration out of the villages is not common.

intensification of agriculture, decline of tenancy due to the fear of tenancy regulations etc.) and (iii) the push-pull effect of regional disparity working through intra-rural labour migration and displacement of previously self-employed persons who entered the market for farm labour. There is no denying the fact that the above factors can explain the growing casualisation of the rural labour in India, at least to some extent.

It appears that Bardhan was misled by the apparent decline in the real agricultural wages during 1964-65 and 1974-75, a lot of which can be attributed to the rise in price level in 1974-75. Secondly, there is no reason why a rapid increase in population growth would not lead to a growing incidence of regular contracts as opposed to casual contracts. Finally, 'impoverishment' theory is not consistent with more recent evidence on trends and wage levels during this period. Hence, we retain our argument of a leftward shift of labour supply curve which has been caused by the following factors, namely, (a) rapid growth of rural non-farm jobs and (b) increasing government efforts with a variety of employment and credit programmes to improve the plight of the rural poor[14] during this period. These factors worked as the 'pull' factor one symptom of which may be the fact that increasing casualisation has gone hand in hand with an increase in real wages not only in the study villages, but also in most states in India.

Nevertheless, the institution of regular farm contracts continues to prevail in rural India. The factors which can be attributed to the persistence of this institution are as follows:

(i) Landlessness, unemployment and poverty of a large number of rural households;

(ii) Various kinds of credit market rigidity and usury;

(iii) Prevalence of the caste system and its close relationship with landlessness;

(iv) Lack of literacy and social awareness of poor households of what is happening around.

Conclusion

The analysis in this chapter suggests that, with the evolution of rural credit and labour markets, the institution of regular farm servants has undergone substantial change in

[14]Kalpana Bardhan claims that these factors are relevant for those somewhat above the poorest strata. This is, however, not true in the study villages. Our analysis in chapter six suggests that farm and non-farm jobs are complements for rural male who come predominantly from families with less landholdings. Also, Walker and Ryan (1990) find that the benefits of MEGS directly accrue to the poorest labourers in Shirapur and Kanzara which explains the significantly negative coefficient of the effect of assets on workers' participation.

the eighties.

With the introduction of various employment and credit programmes, employment and credit constraints on landless labourers are slackening, giving rise to various kinds of wage employment and self-employment opportunities. As various alternative employment opportunities are coming up, rural labourers including the landless ones in the villages are becoming reluctant to take on regular farm jobs. Under the pressure of circumstances, the following trends have set in:

(a) Due to better employment and credit facilities made available to the rural labourers, especially to the landless ones, there has been a declining incidence of regular farm contracts[15]. This has been followed by a growing casualisation of the rural labour force which primarily reflects the growth of non-farm and governmental jobs as well as the availability of cheap credit .

(b) The decline of regular labour has occurred hand in hand with the introduction of various types of contractual arrangements to suit the needs of employers and employees, which generally marks a trend towards casualisation of the rural labour force. This has been accompanied by the rise of real casual and regular wages, possibly manifesting a leftward shift of labour supply and not an upward shift of labour demand.

(c) Interestingly enough, the relation between employers and regular farm servants has also undergone some changes. Nowadays, even the poorer labourers are in a stronger bargaining position vis-a-vis their employers. The employer-employee relation is just confined to farm work and does not usually extend to the domestic work for the employer as was the case before. The extent of extra-economic coercion or patron-client relationship has been reduced to a minimum.

However, inter-regional differences are observed. The higher the economic prosperity of a village, the higher the growth of farm and non-farm employment opportunities as well as access to better credit facilities; consequently, the lower is the incidence of regular contracts (and/or the better is the conditions for regular farm servants). This necessitates that the government to undertake further measures to alleviate the constraints operating in the labour and credit markets for the poorer labourers in the more deprived villages.

Given an already existing unequal distribution of land and non-land resources, free functioning of the rural labour markets may not ensure the best outcomes in terms of wage and employment of the rural labour force. Different kinds of intervention including both

[15]Existence of long-term contracts does not allow flexibility in market adjustment in response to demand-supply shifts. Thus a general trend towards casualisation of the labour force may lead to increased efficiency of the labour market.

long-term and short-term ones may be suggested at this point:

(a) Redistribution of both land and non-land assets.

(b) Encouraging workers' mobility through the introduction of education and training programmes.

(c) Removing imperfections in the credit market.

(d) Formulating and implementing legislation governing wages and working conditions of workers.

(e) Generation of more non-farm employment opportunities for rural labour, especially in the slack season.

(f) Strengthening workers' organisations to exercise some bargaining power over wages and employment levels by controlling the supply of labour.

While (a) and (b) refer to long-term policies of intervention, (c), (d) and (e) refer to those governing short-term interventions. An effective implementation of short and long-term measures may help to reduce the problems of poverty and inequality among the rural labour in India.

With the increase in government intervention and the implementation of different credit and employment programmes, a process of casualisation of labour has started. This is a move in the right direction; it not only alleviates credit and labour market rigidity, but also strengthens the bargaining position of the rural landless poor. However, given the regional dispersion, the desired impact is still lagging behind expectation.

CHAPTER 7 : TABLES

TABLE 1.1. Changing Composition of Main and Marginal Workers in Rural India, 1972-73, 1977-78 and 1983

Status of Employment	1972-73		1977-78		1983	
	Male	Female	Male	Female	Male	Female
Self	65.9%	64.5%	62.8%	62.1%	60.4%	62.2%
Regular	12.1%	4.1%	10.6%	2.8%	10.8%	3.1%
Casual	22.0%	31.4%	26.7%	35.1%	28.8%	34.7%

Source : Vaidyanathan (1986).

TABLE 1.1'. Sectoral Distribution (%) of Rural Workers in India, 1977-78 and 1983

Sector	1977-78		1983	
	Male	Female	Male	Female
Agriculture, Hunting, Forestry, Fishing	80.6	88.1	76.8	86.7
Mining, Quarrying, Manufacturing	7.1	6.2	8.0	7.2
Construction	1.7	0.6	2.6	0.9
Trade, Transport	5.5	2.0	6.5	2.1
Community, Social & Personal Services	5.1	3.0	5.9	3.0

Source : Vaidyanathan (1986) (based on NSS data).

TABLE 1.1". Per Cent Distribution of Male Working Force by Main Activity, All India (Excluding Assam), 1971 and 1981

Main Activity	1971	1981
Cultivation	55.73	55.16
Agricultural Labour	25.61	24.00
Plantation & Forestry	2.39	2.50
Mining & Quarrying	0.43	0.49
Household Manufacturing	3.19	2.87
Non-Household Manufacturing	2.49	3.82
Construction	0.83	1.12
Trade & Commerce	2.75	3.27
Transport & Communication	0.97	1.37
Other Services	5.62	5.39

Source : Krishnamurty (1984) (based on Census data).

TABLE 1.1.1. Inter-State Variation in the Distribution of Casual Labour in Public Works, 1977-78

States	% of Total Casual Labour in Public Works		
	Male	Female	Total
Andhra Pradesh	2.80	1.16	1.98
Assam	4.79	14.87	6.34
Bihar	3.16	1.88	2.75
Gujrat	0.30	*	0.18
Haryana	8.15	*	6.34
Himachal Pradesh	32.83	17.31	30.46
Jammu & Kashmir	20.82	20.00	20.77
Karnataka	2.23	2.22	2.23
Kerala	0.80	0.67	0.74
Madhya Pradesh	9.33	6.58	8.00
Maharashtra	7.49	6.61	7.00
Orissa	1.64	0.37	1.13
Punjab	8.19	*	7.45
Rajasthan	6.75	*	4.32
Tamil Nadu	2.53	1.21	1.90
Uttar Pradesh	6.90	1.04	5.33
West Bengal	2.10	1.88	2.05

Source : S. Mukhopadhyay (1987) (based on NSS data).

TABLE 1.1.1'. Average Daily Earnings of Male Labourers (in Rs.) in Different States, 1974-75 and 1977-78

States	1974-75		1977-78	
	Farm	Non-Farm	Farm	Non-Farm
Andhra Pradesh	2.66	2.80	3.50	4.39
Assam	4.02	3.29	5.12	5.42
Bihar	3.24	3.38	3.39	4.53
Gujrat	3.22	3.22	3.89	5.70
Haryana	*	*	5.75	6.06
Karnataka	2.87	3.16	3.04	4.15
Kerala	5.97	5.48	6.65	6.72
Madhya Pradesh	2.42	2.47	2.76	6.79
Maharashtra	2.64	2.68	3.15	4.53
Orissa	2.64	2.50	3.07	3.75
Punjab	5.60	5.10	7.08	7.71
Rajasthan	3.85	3.27	4.33	5.37
Tamil Nadu	3.69	3.56	3.89	4.32
Uttar Pradesh	3.21	3.66	3.63	5.20
West Bengal	3.49	3.27	3.98	5.37

Source : Vaidyanathan (1986) (based on NSS data).

TABLE 1.2. Composition of Workers in the Study Villages, 1975-84 and 1989

Employment Status	Aurepalle		Shirapur		Kanzara	
	1975-84	1989	1975-84	1989	1975-84	1989
Self	0.40	0.45	0.39	0.69	0.51	0.27
Casual	0.23	0.23	0.28	0.10	0.20	0.33
Regular	0.24	0.16	0.10	0.02	0.15	0.10
Others	0.13	0.16	0.23	0.18	0.14	0.31

Note : The definition of different types of employment status is given the text. Each entry refers to the proportion of workers in the respective type of employment status.

TABLE 2.1. Distribution of Rural Households According to the Source of Credit, 1971 and 1981, All India

Source of Credit	Cultivators		Non-Cultivators		All Rural Hhs	
	1971	1981	1971	1981	1971	1981
A. Formal	31.7	63.2	10.8	36.7	29.2	61.2
Government	7.1	3.9	3.4	4.5	6.7	4.0
Co-operatives	22.0	29.8	6.0	13.9	20.1	28.6
Commercial Banks	2.4	28.8	0.8	17.3	2.2	28.0
Insurance	0.1	0.4	0.2	-	0.1	0.3
Provident Fund	0.1	0.3	0.4	1.0	0.1	0.3
B. Informal	68.3	36.8	89.2	63.3	70.8	38.8
Landlords	8.1	3.7	12.6	8.4	8.6	4.0
Agri. Money-lenders	23.0	8.3	23.8	11.4	23.1	8.6
Prof. Money-lenders	13.1	7.8	18.7	13.4	13.8	8.3
Traders	8.4	3.1	10.9	5.8	8.7	3.4
Relatives/Friends	13.1	8.7	19.0	14.4	13.8	9.0
Others	2.6	5.2	4.2	9.9	2.8	5.5
C. Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: RBI bulletin, 1986

TABLE 2.2. Per Cent of Households Having Access to Formal Credit in the Study Villages, 1975-79 and 1980-84

Villages	Labour Households		Small Farms		Medium Farms		Large Farms	
	75-79	80-84	75-79	80-84	75-79	80-84	75-79	80-84
Aurepalle	0	0	0	52%	26%	15%	43%	59%
Shirapur	61%	75%	56%	38%	62%	68%	71%	73%
Kanzara	0	0	80%	95%	81%	82%	82%	97%

Note : Formal credit includes credit offered by the commercial banks, land-development banks, cooperatives, government etc.

TABLE 3.2.2. Per Cent Share of Casual Labour in Rural Work Force in Different States in India, 1972-73 and 1977-78

States	Male		Female	
	1972-73	1977-78	1972-73	1977-78
Andhra Pradesh	27.42	33.58	48.98	52.76
Bihar	24.05	32.63	36.00	45.72
Gujrat	25.01	29.41	26.31	32.07
Haryana	9.67	14.94	8.38	18.71
Kerala	39.13	37.71	47.65	32.22
Madhya Pradesh	15.50	22.17	24.79	31.11
Maharashtra	31.78	30.79	44.76	46.77
Punjab	16.01	19.04	9.58	8.55
Rajasthan	5.47	10.85	4.86	8.27
Tamil Nadu	31.30	35.20	45.92	57.29
Uttar Pradesh	13.83	16.33	15.32	20.21
West Bengal	32.09	34.07	38.89	33.14
India	22.03	26.65	31.44	35.06

Source : Krishnamurty (1984) (based on NSS data).

TABLE 4.1. Some Socio-Economic Indicators at the State-Level

Indicators	Andhra Pradesh	Maharashtra
Population Density in 1981 [1]	195	204
% of literacy in 1981 [2]	25 (20)	39 (35)
Annual Rainfall (mm.)	879	1314
% of gross cropped area irrigated in 1982	31.4	9.1
Rate of Growth of NDP in Agriculture during 70/71-84/85 [3]	2.13	4.21
State domestic product per capita in 1984-85[4]	705	1017
% of total villages electrified in 1988-89	97.4	98.2
% of villages connected with all-weather roads in 1987-88	43.0	52.9
State-wise rural monthly p.c. consumer expenditure in 1977-78[5]	69.7	76.9
% of population below poverty line in 1983/84	36.4	34.9
% of casual agricultural labour in Public Works in 1977-78	2.15	8.00
% share in total factory employment in 1984-85[6]	8.7	16.0

Note : [1] Measured in thousands per square km.

[2] Numbers in parentheses refer to the female literacy rate.

[3] Rate of growth of net domestic product (NDP) in Rs. of workers in agriculture (70/71=100).

[4] State domestic product per capita in 84-85 is measured in Rs. at 70-71 prices.

[5] Per capita (p.c.) consumer expenditure in Rs. at 70-71 prices.

[6] It includes factory units employing ten or more workers using power and also those factory units employing twenty or more workers not using power. It does not include working proprietors or unpaid family workers.

Source : S. Mukhopadhyay (1992); A.V. Jose (1992); India data base by H.L Chandhok and the Policy Group, 1990; India Economic Information Year Book, Agarwal, Varma and Gupta, 1988-89; Statistical Outline of India, Department of Economics and Statistics, Tata Services Ltd., 1989-90.

TABLE 4.2. Changes in Non-Agricultural Employment, Real Wages and Casualisation in Percentage of Rural Labour Force During 1972-73 and 1977-78

States	% Change in Employment during 1972-73 to 1977-78			
	(i) Non-farm Employment [1]	(ii) % Share of Casual Labour in Total Rural Labour Force [2]		(iii) Male Real Wages [3]
		Male	Female	
Andhra Pradesh	+7.66	+6.16	+3.78	+10.16
Assam	-49.19	*	*	-6.02
Bihar	-6.44	+8.58	+9.72	+27.76
Gujrat	-14.49	+4.4	+5.76	+28.86
Haryana	+26.21	+5.27	+10.33	+0.93
Jammu and Kashmir	+37.11	*	*	+29.17
Karnataka	-6.34	*	*	-1.72
Kerala	-1.59	-1.42	-15.43	+13.93
Madhya Pradesh	+7.2	+6.67	+6.32	+13.21
Maharashtra	-31.03	-0.99	+2.01	14.15
Orissa	-8.04	*	*	-2.01
Punjab	+26.63	+3.03	-1.03	+16.47
Rajasthan	+25.81	+5.38	+3.41	+2.70
Tamil Nadu	+26.51	+3.90	+11.37	+4.74
Uttar Pradesh	+5.39	+2.50	+4.89	+10.46
West Bengal	+3.09	+1.98	-5.75	+11.33

Note : [1] Calculated from Vaidyanathan (1986);

[2] Calculated from Krishnamurty (1984) (based on NSS data).

[3] Calculated from Acharya (1989), 'Agricultural Wages in India : A Disaggregated Analysis', Indian Journal of Agricultural Economics, 44(2).

[4] Each entry in 1972-73 corresponds to population in the age-group 15-59 years while that in 1977-78 refers to the population aged more than 5 years.

SUMMARY AND CONCLUSION

As discussed in the introductory chapter, the intention of this dissertation is to analyze the coexistence of casual and regular labour contracts in Indian agriculture. In particular, we have dealt in some detail with two relevant decision problems: (i) how an employer chooses between casual and regular contracts and (ii) how a labourer chooses between casual and regular contracts. We have attempted to examine these issues from both a theoretical and an empirical perspective. This chapter presents an overview of the findings, and some concluding remarks.

1. Theoretical Issues

1.1. Earlier Contributions

Village studies and household surveys bring out a number of stylised facts relating to the coexistence of casual and regular labour contracts in Indian agriculture. It has been argued (chapter one) that existing labour-market theories fail to account for all these stylised facts, and to provide satisfactory explanations of the coexistence of regular and casual contracts.

(a) Dual labour market theories, developed in the context of advanced industrial economies, cannot be easily applied in the context of Indian agriculture. Their concerns are rather different, and so are the empirical facts they attempt to explain. For instance, these theories have placed strong emphasis on exogenous workers' characteristics such as race or sex, which cannot explain the segmentation of the labour market between casual and regular contracts in Indian agriculture. Similarly, these theories neglect crucial aspects of the labour market in Indian agriculture, such as the seasonality, which play a central role in the coexistence of casual and regular labour contracts.

(b) Some variants of the efficiency wage models (based on shirking and nutrition) attempt to explain the coexistence of casual and regular contracts. As we saw in chapter two, however, efficiency wage arguments have primarily been used to explain the substitution of casual labour contracts for regular contracts rather than their coexistence.

(c) Screening models are not plausible for a small, closed village economy. This is because the asymmetric-information assumption that employers do not know the personal characteristics of prospective labourers is not valid in such an economy.

(d) Finally, a group of models argue that the coexistence of casual and regular contracts in rural India reflects the sharing of risk between employers and labourers in the context of seasonal agriculture. Some of these models also include considerations such as 'recruitment costs', and 'wage fluctuations' between slack and peak seasons, as the primary motives for regular labour contracts. These theories come closer to a persuasive explanation, but, as discussed in chapter two, they leave a number of stylised facts unexplained or ignored, e.g., seasonal unemployment, farm heterogeneity, the role of workers' characteristics and the prevalence of advance payments in regular contracts. Our purpose has been to refine and extend this last group of models, taking into account the relevant stylised facts.

In short, at least three important shortcomings of the existing literatures motivate an in-depth investigation of the issues examined in this thesis : (i) few labour-market models have explicitly analyzed the coexistence of regular and casual labour contracts in agriculture, (ii) the existing theories do not account for the observed stylised facts, (iii) the existing theories have not been subjected to detailed empirical scrutiny.

1.2. Alternative Models

In chapter two, we have developed four different models to explain or characterise the coexistence of casual and regular labour contracts in agriculture. These are as follows:

(a) *Implicit Contract Model.* If farmers are risk-neutral and workers risk-averse, farmers may insure a group of labourers against the fluctuations of wage and employment by offering them employment over a prolonged period at a predetermined wage. In the process, farmers will be able to pay a lower wage per day to the regular labourers as compared to the casual labourers, where the wage differential constitutes an insurance premium.

However, if resale of labour in the slack period is not possible, farmers may have to bear the 'hoarding costs' of maintaining a fixed pool of regular labour, where 'hoarding costs refer to the cost of paying regular labour when their productivity is low in some slack periods. Given these hoarding costs, farmers may not hire regular labourers only; they may hire some casual labourers as well (even though the daily wage rate for casual labourer is higher than the daily earnings of a regular labourer. Hoarding costs are particularly high for the smaller farms who have a relatively low demand for labour in the slack period; this induces them to rely primarily on casual labourers.

(b) *Shirking Model.* The second model is a variant of the efficiency wage theory. Here we assume that some tasks are difficult to supervise, because effort is unobservable.

Employment of casual labourers in these non-monitorable tasks may be inefficient since, by the very nature of the contract, casual labourers are paid even if they shirk. However, a regular labourer may be fired if the work is not done properly. Further, if the wage rate is higher for regular than for casual labourers, regular labourers will have an incentive to avoid being fired. Thus if a farm offers regular contracts with additional incentives, it may succeed in inducing the regular labourers not to shirk in the non-monitorable tasks, while employing casual labourers to perform other monitorable tasks.

(c) *Collateral Model.* Rural credit markets in India are segmented between formal and informal sectors. Credit is cheaper in the formal sector, though it requires some collateral to be offered. Land is the most acceptable form of collateral in these village economies. Due to their inability to offer the required collateral, it is difficult for landless labourers to secure credit. Hence, risk-averse landless labourers usually go to the informal credit market where the marginal cost of credit is comparatively higher.

Usually casual labourers are paid on a daily basis, while a major portion of regular wages are paid at the beginning of the contract, and no interest is charged on this advance. Consequently, regular contracts with advance payment (i.e., implicit credit) may represent an attractive arrangement for landless labourers. If the marginal cost of credit is higher for labourers than for employers, and if there is no uncertainty about casual wages, then there exists a wage level for regular contracts such that these contracts are mutually beneficial to employers and labourers.

(d) *Time Constraint Model.* The opportunity cost of time is different for landed and landless labourers. Landless labourers do not have any obligation to spend labour-time on family land so that they can offer their entire non-leisure time in the labour market. On the other hand, landed labourers with obligations to work on family land cannot easily spare the time to participate in regular jobs. In other words, given that the opportunity cost of pre-committing time is lower for landless labourers, they have a comparative advantage in regular contracts.

It has also been shown that, in each of these models, alternative employment opportunities (in the household or outside) play a significant role. If alternative employment opportunities expand, the supply curve for regular labour shifts to the left. Under these circumstances, several outcomes are possible. In particular: (i) farmers may shift to alternative contractual arrangements (e.g., casual labour), leading to a decline in the incidence of regular labour contracts, (ii) wage and non-wage benefits in regular contracts may be revised upwards so as to enhance labourers' incentives to participate in regular labour contracts. Generally, of course, we would expect both effects to take place.

2. Empirical Issues

2.1. Background

The empirical investigations presented in this thesis (chapters three to seven) focus mainly on three villages, namely, Aurepalle, Shirapur and Kanzara (the 'study villages'), situated in the semi-arid tropics of India. The primary data-set involves observations of a cross-section of 120 households in these villages over a period of five years (1980-84). This data-set made available by ICRISAT has been supplemented by the following sources : (i) ICRISAT resurvey of the three study villages in 1989; (ii) my own resurveys of Aurepalle in 1991 and 1992; (iii) reports of some large-scale sample surveys like the National Sample Survey (NSS) and the Census and (iv) reports from other available village studies.

As shown in chapter three, there is a positive correlation between land ownership and land quality (or value) in the study villages. There is also a positive correlation between land ownership and non-land resources per acre. This does not invalidate the use of land area as an index of productive endowment, although it does mean that land area underestimates the extent of inequality in the ownership of productive resources. We also found a strong correlation between land ownership and income per household as well as between caste and land ownership.

2.2. Determinants of Labour Participation

In chapter four, we have examined the determinants of labour force participation in the study villages. Two elementary determinants are sex and season. Regular labourers are predominantly male while females dominate in the casual labour market. There is pronounced seasonality in the labour demand as well as in labour participation.

Another preliminary observation of some relevance is that daily regular wages (i.e., daily earnings from regular labour contracts) are lower than daily casual wages; this remains true if we adjust casual wages to take unemployment into account (by multiplying casual wages by (1 - u), where u is the unemployment rate. Hence, risk-neutral landless labourers ought to prefer casual contracts to regular contracts. However, this conclusion need not apply if we take account the fact that regular labourers receive a large part of their wages in advance and that the comparative attractiveness of casual and regular contracts for labourers depends quite crucially on credit and alternative employment opportunities.

Using a probit maximum likelihood technique, the workers' choice of contract in Aurepalle (based on my resurvey data) has been examined. Family landholding is found to be a good index of credit and time constraints of the potential workers in the study villages. The significance of workers' family landholding as an explanatory variable suggests that individuals from families with smaller landholdings have high marginal costs of credit and low opportunity costs of time and are, therefore, more likely to choose regular labour contracts. Besides, workers' age, education and caste are found to be significant explanatory variables, all of which reflect the influence of alternative employment opportunities on the choice of regular contract.

Two sets of tobit models are used to analyse casual-labour participation in all the study villages. Male and female casual labourers from families with smaller landholdings participate more in casual agricultural employment because their opportunity cost of time is lower than for those with larger family landholdings. Female participation comes primarily from the lowest castes, but the same does not apply to male labourers (probably low-caste men have a higher propensity to engage in regular contracts). Farm and non-farm employment are complementary as far as male labour is concerned, but not so for female members (female labourers are largely excluded from casual non-farm employment). Taken together, our results suggest that family characteristics are more important than personal characteristics as determinants of casual-labour participation.

2.3. Determinants of Involuntary Unemployment

A tobit model has been used to analyse the incidence of unemployment among male and female casual labourers (chapter six). As expected, duration of unemployment (number of days unemployed per month) significantly declines in the peak season, when the demand for labour expands. Also the monthly duration of unemployment is higher in less prosperous villages like Shirapur compared to others like Kanzara. Interestingly, labourers from families with larger landholdings are found to experience greater duration of unemployment. This may be because they look for jobs which are low in demand (e.g., skilled jobs); because employers prefer to employ 'habitual' employees rather than 'occasional' entrants in the labour market; or because involvement in regular labour reduces the incidence of unemployment among households with little land.

2.4. Determinants of Labour Demand

The implicit contract model and the shirking model point to two determinants of the demand for regular labour, namely, size of farm and nature of tasks. We have examined the significance of these two variables and of other possible determinants of the demand for regular labour, using regression analysis (chapter five).

Univariate probit and tobit models have been estimated to determine the type of contract a farm offers and the demand for regular labour-hours respectively. We have also estimated a 'double-hurdle model' in which the farms' choice of contract and the demand for regular labour-hours (if a regular contract is chosen) are simultaneously determined. All the estimates confirm that regular contracts are more likely to be offered by larger farms. In addition to farm size, irrigation facilities and ownership of farm equipments favourably affect the likelihood of hiring a regular farm servant. Availability of family labour, on the other hand, acts as a substitute to the demand for regular labour. Despite the fact that regular labour has zero marginal cost, farm size has positive effect on regular labour-hours among farms with a single regular labourer; as explained in chapter five, this finding lends support to the notion that there are substantial 'hoarding costs' associated with hiring regular labour, particularly in smaller farms.

Next, the relationship between the nature of agricultural tasks and the type of the labour contract is examined. Tasks which are difficult to supervise (e.g., soil preparation, spreading fertilizer, irrigation) are called non-monitorable tasks, while those easy to supervise (e.g., harvesting and post-harvesting) are monitorable tasks. The probability of employing only casual labour is higher for monitorable tasks, though the probability of employing only regular labour in non-monitorable tasks is very low in Shirapur and Kanzara. It is only in Aurepalle that the probability of employing only regular labour for non-monitorable tasks is higher than that of employing only casual labour. However, when cropping patterns are accounted for, it appears that in the production of paddy in Aurepalle, it is more likely that a large farm employs regular farm servants for the non-monitorable tasks as opposed to the monitorable ones.

We have computed chi-square statistics of association between type of contract and type of tasks. We have also run multivariate tobit and truncated regressions to investigate whether task type has a significant influence on the demand for regular labour-hours (this exercise has been carried out separately for all farms and for farms hiring regular labour). Neither the chi-square tests nor the tobit/truncated regressions lend support to the notion that task type are important determinants of employers' choice between casual and regular labour. In other words, we have found no empirical support for the hypothesis of task-based segmentation of labour contracts (the 'shirking model' developed in chapter two).

2.5. Trends in Labour Contracts

The growth of alternative employment opportunities in the study villages in recent years has had an adverse effect on the incidence of regular contracts (chapter seven). As alternative credit and employment opportunities have expanded, rural labourers are increasingly reluctant to participate in regular contracts unless they have pressing credit requirements. Farmers are found to complain about the non-availability of reliable regular farm servants in spite of the increase in real wages. Similar observations have been made in many other parts of India. In the light of these observations, we have argued that the decline in regular labour in rural India is primarily caused by a decline of labour supply rather than by a decline in demand. This is in contrast with the common view that the recent casualisation of labour contracts in rural India goes hand in hand with a process of impoverishment of agricultural labourers (the latter is inconsistent with the sustained increase of real wages for both regular and casual labourers).

The extent of casualisation of the agricultural labour force has not been uniform among the study villages. The higher the degree of growth and wealth accumulation in a village, the greater is the extent of casualisation of labour.

3. Concluding Remarks

The empirical findings of this thesis are consistent with the implicit contract model, the collateral model and the time constraint model (and these models are consistent with each other). However, as mentioned earlier we have found no support for the shirking (efficiency wage) model.

In terms of policy implications, these findings underline the role played by economic insecurity, credit constraints and limited employment opportunities in perpetuating regular labour contracts in agriculture. If the incidence of these contracts is to be reduced (and there are good grounds for attempting to do so, not only on efficiency grounds, but also in view of extra-ordinarily poor terms of employment of regular labour), intervention should be directed at removing these disadvantages experienced by agricultural labourers. Possible means of doing so include redistribution of land and other assets, provision of educational facilities and training programmes, targeted supply of subsidized credit without collateral requirements, generation of non-farm employment opportunities (especially in the slack seasons) and strengthening of workers' organisation. While current trends already seem to be going in the right direction, much can be done to accelerate them.

APPENDIX

Appendix. 1

1. Inequality Measures

'Inequality obviously suggests a departure from equality' (Cowell, 1977). In this section, we shall discuss a few inequality measures which satisfy the properties of an ideal measure of inequality. We shall refer to the distribution of different variables like land and other non-land resources. However, for expositional purpose, we shall refer to all of them as income.

An ideal index of inequality should satisfy the following properties (Sen, 1973) :

(i) it should be independent of the change in mean or scale;

(ii) It should be independent of the change in population size;

(iii) it should satisfy the Pigou-Dalton condition which requires the measure of inequality to increase if there is a transfer of income from a poorer person to someone richer.

1.1. Variance and the Coefficient of Variation

There are different measures of inequality and these are defined in terms of a distribution of income.

Suppose there are n households who are arranged in ascending order of income such that $y_1 \leq y_2 \leq .... \leq y_n$ and let μ be the mean of this income distribution. There are a number of inequality measures which are based on the dispersion of the distribution. For example, range, absolute mean deviation, relative mean deviation, variance and coefficient of variation are all suggested as different measures of inequality. Variance and the coefficient of variation are relatively widely used in the literature. Common definitions of variance and coefficient of variation in the distribution $y = (y_1, y_2, ..., y_n)$ are as follows:

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

$$CV = \frac{\sigma}{\mu} \; ; \; CV^2 = \frac{\sigma^2}{\mu^2}$$

where μ is the mean of the distribution.

While variance fails to satisfy the property of mean independence, the coefficient of variation satisfies all three desirable properties of an inequality index.

1.2. Theil's T and L Indices

We Consider Theil's T and L indices (Glewwe, 1986) as two measures of inequality both of which satisfy all the desirable properties of a good inequality index. The choice is guided by the fact that these indices are decomposable. An inequality measure is decomposable according to the population groups if it can be expressed as the weighted average of the same measure for different groups (within group component) plus the inequality measure for the population as a whole where each member is given the average income of its particular group (between-group component). If the weights for the between-group component are the population shares, we call it weakly decomposable; if, however, these are income shares, it is weakly decomposable.

Let y^h_i be the income of the ith household in the h-th landholding class, h = 1,2,...,H where H is the total number of landholding classes in the sample. Let there be n_h households in each landholding class so that $\Sigma_h n_h = n$ is the total number of households in the sample. Therefore, $y^h = \Sigma_i y_i^h$ is the total income of the households in the hth landholding class. Following measures are defined with respect to the income distribution :

Theil's entropy index (T) is defined as :

$$T = \sum_h \sum_i \frac{y_i^h}{y} \ln\left(\frac{\frac{y_i^h n}{Y}}{\frac{1}{n}} \right)$$

$$= \sum_h \frac{y^h}{y} T_h + \sum_h \frac{y^h}{y} \ln\left(\frac{\frac{y^h}{y}}{\frac{n_h}{n}} \right);$$

$$T_h = \sum_i \frac{y_i^h}{y_h} \ln\left(\frac{\frac{y_i^h}{y_h}}{\frac{1}{n_h}} \right)$$

where n is the total number of households in the population. In other words, T is the sum of within group component and between group components. T satisfies all three desirable properties of an ideal index of inequality. Moreover, it is weakly decomposable. T is defined even when y=0.

A second measure is Theil's entropy index (L) which is defined as follows :

$$
\begin{aligned}
L &= \sum_h \sum_i \ln\left(\frac{y}{y_i^h n}\right) \\
&= \sum_h \sum_i \frac{1}{n} \ln\left(\frac{\frac{1}{n}}{\frac{y_i^h}{y}}\right) \\
&= \sum_h \frac{n_h}{n} L_h + \sum_h \ln\left(\frac{\frac{n_h}{n}}{\frac{y_h}{y}}\right) \\
L_h &= \sum_i \frac{1}{n_h} \ln\left(\frac{\frac{1}{n_h}}{\frac{y_i^h}{y_h}}\right)
\end{aligned}
$$

L is also expressed as the sum of within group components and between group components. L satisfies the properties of mean and population independence; it also satisfies the Pigou-Dalton sensitivity condition. Moreover, L is additively decomposable in the strict sense. However, L is not defined for zero income level since ln(y) tends to infinity as y tends to zero.

Appendix. 2

2.1. Some Tests of Independence

Two variables X and Y are said to be independent if the joint probability is the product of the marginal probabilities, i.e., P(XY) = P(X) * P(Y). This can be explained on the basis of a bivariate contingency table. Each cell (i,j) in the contingency table denotes the number of cases (frequency) taking values $X=X_i$ and $Y=Y_j$. Along with the frequency, we can calculate row and column percentages keeping one/other variable, in this bivariate framework, constant. These are known as the marginals. To construct a statistical test of independence, we calculate the following :

$$P(X_i\ ,\ Y_j) = \left(\frac{count \in row\ i}{N}\right)\left(\frac{count \in column\ j}{N}\right)$$

where N is the sample size. To obtain the expected number of observations E_{ij} in each cell (i,j), the probability P_{ij} is multiplied by N.

$$E_{ij} = \left[\frac{(count \in row\ i) * (count \in column\ j)}{N}\right]$$

A statistic that has often been used to test the hypothesis that the row and the column variables are independent is Pearson's chi-square statistic. It is calculated by summing over the squared residuals of all cells divided by the expected frequencies. The statistic thus provides a numerical index of the discrepancy between P_{ij} and E_{ij}. Expected frequencies are the frequencies that would be expected if the variables of interest are not related. Therefore, any significant discrepancy between P_{ij} and E_{ij} establishes the fact that the variables are related.

$$\chi^2 = \sum_i \sum_j \left[\frac{(P_{ij} - E_{ij})^2}{E_{ij}}\right]$$

An alternative to Pearson's chi-square is the likelihood ratio (LR) chi-square which is based on the value of maximum likelihood function. For large sample Pearson's chi-square and LR chi-square give very similar results.

However, the magnitude of the observed chi-square depends not only on the goodness of fit of the independence model, but also on the sample size. If the sample size increases, so does the value of chi-square. Hence, we calculate **Cramer's V** that corrects χ^2 for the influence of the sample size and provides a more easily interpreted measure of the strength of the relationship.

$$V = \sqrt{\left[\frac{\chi^2}{N}(n - 1)\right]}$$

where n is the number of rows or columns whichever is smaller and N is the total number of cases.

2.2. Ordinal Measures of Association

The degree of association between two ordered variables may be measured by the concept of correlation. The Spearman correlation coefficient is a commonly used measure of correlation between two ordinal variables. For all cases, variables are ranked from the smallest to the largest values. Pearson correlation coefficient, on the other hand, is computed on the ranks. Correlation is positive if the higher value of one variable is associated with a higher value of the second variable. However, correlation is negative if the higher value of one variable is associated with a lower value of the other.

Appendix : 3

Diagnostic Tests : Probit and Tobit Models

3.1. Goodness of Fit

In an ordinary linear regression, multiple correlation coefficient R^2 serves as the appropriate test statistic. In a limited dependent model (probit/tobit), however, R^2 loses its relevance. Hence, we have to use some alternative test statistics.

The simplest way to check the goodness of fit is to report the maximized value of the log-likelihood function ($\hat{L}$). One can also report the value of the log-likelihood function (L_0), when the coefficients of all the regressors except that of the constant term are zero. In a probit model one can combine $\hat{L}$ and L_0 in a single goodness of fit statistic (Greene, 1991), giving rise to the likelihood ratio index (LRI) as follows :

$$LRI = \left[1 - \left(\frac{\hat{L}}{L_0}\right)\right]$$

where $\hat{L}$ is the natural logarithm of the maximised value of the likelihood function and L_0 is the value of the likelihood function when there is only the constant intercept term (assuming that all the other parameters are zero).

More importantly, one may construct a statistical test for the joint significance of the regression coefficients. Using a likelihood ratio (LR) test, this can be done as follows.

$$LR = 2(\hat{L} - L_0) \sim \chi^2_k$$

which follows a chi-square distribution with a degree of freedom equal to k where k is the number of regressor in the model.

3.2. Normality

It is assumed that the random variables in probit and tobit models follow a normal distribution. If, however, they are not normally distributed in reality, maximum likelihood probit and tobit estimates are inconsistent. Hence, we need to test for normality.

Let us first consider the standard latent variable model for the univariate probit.

$$Y_i^* = X_i' \beta + u_i$$
$$\textit{where } u_i \sim N(0\ ,\ 1)\ ,\ i = 1\ ,\ 2\ ,...,\ n$$

Under normality, Y_i^* is distributed with a mean $X_i'\beta$ and a variance unity where n is the sample size.

Following Rudd (1984) and Pagan and Vella (1990), we can parameterise the alternative hypothesis of non-normality as follows :

$$\Phi[x_i'\beta + \gamma_2(x_i'\beta)^2 + \gamma_3(x_i'\beta)^3] \quad (1)$$

where $\Phi(.)$ is the cumulative distribution function of a standard normal variable.

This specification is based on the fact that any marginal distribution function can be approximated by a power series expansion of the normal distribution. Suppose, the true probability that $Y_{ji} = 1$ is $G(x'\beta)$ as follows :

$$G(x_i'\beta) = F[\xi(x_i'\beta)]$$

where $\zeta(.)$ is an m-th order power series with a non-negative first derivative as follows :

$$\xi(x_i'\beta) = \sum_{n=1}^{m} \gamma_n(x_i'\beta)^n$$

If we assume that m = 3 and if we normalise $\gamma_0 = 0$, $\gamma_1 = 1$, (1) holds good. It follows that when $(x_i'\beta)$ is normally distributed, $\gamma_2 = \gamma_3 = 0$[1].

Given the above specification of the null and the alternative hypothesis, we can construct a RESET-type (Ramsey, 1969) likelihood ratio statistic to test the following hypothesis :

$$H_0 : \gamma_2 = \gamma_3 = 0.$$

[1]Normal distribution has the property that the third central moment (moment about mean of the distribution) is zero and the fourth moment is the square of the second moment which is normalised to 1.

We maximise the ordinary probit log-likelihood function L to estimate $\beta = \hat{\beta}$. Given these estimates, we can obtain the predicted value $x_i'\hat{\beta}$. Finally we plug $(x_i'\hat{\beta})^2$ and $(x_i'\hat{\beta})^3$ as two additional regressors into the probit equation as follows :

$$Y_i^* = x_i'\beta + \gamma_2(x_i'\beta)^2 + \gamma_3(x_i'\beta)^3 + u_i$$

Hence, the final parameter vector contains $(\beta, \gamma_2, \gamma_3)$. We estimate the log-likelihood L_1 of the modified probit function to obtain the parameter estimates $(\tilde{\beta}, \tilde{\gamma}_2, \tilde{\gamma}_3)$.

The final step is to construct a likelihood ratio statistic as follows:

$$LR = 2(\hat{L}_1 - \hat{L})$$

where $\hat{L}_1$ is the value of the log-likelihood function of the modified probit while $\hat{L}$ is the value of the original probit log-likelihood function (when γ's are restricted to zero).

Under the null hypothesis H_0, LR follows a χ^2 distribution with 2 degrees of freedom where 2 is the number of restrictions ($\gamma_2 = 0$ and $\gamma_3 = 0$) on the likelihood function.

Following Pagan and Vella (1990), a similar likelihood ratio test for tobit models can be performed.

3.3. Heteroscedasticity

There may be different ways of testing heteroscedasticity in a limited dependent model (Davidson and Mackinon, 1984; Pagan and Vella, 1990; Greene, 1991). Following Greene (1991), we perform a likelihood ratio test of heteroscedasticity.

First we consider the probit model as before where the log-likelihood function is as follows:

$$L_2 = lnL = \sum_i [y_i \ln\Phi(\beta' x_i) + (1 - y_i) \ln(1 - \Phi(\beta' x_i))]$$

Now suppose there is a multiplicative heteroscedasticity (Godfrey, 1978) term as follows:

$$E(u_i) = 0 \ ; \ Var(u_i) = \exp(\gamma' Z_i) \ ;$$
$$i = 1,2,....,n$$

Once we incorporate the heteroscedasticity term, the probit log-likelihood function will be modified to:

$$L_3 = lnL = \sum_i [y_i \ln\Phi(\frac{(\beta' x_i)}{\exp(\gamma' z_i)}) + (1 - y_i)\ln(1 - \Phi(\frac{\beta' x_i)}{\exp(\gamma' z_i)})]$$

The null hypothesis is

$H_0 : \gamma = 0$ (homoscedasticity).

Under the null hypothesis the likelihood ratio (LR) statistic can be constructed as follows :

$$LR = 2(\hat{L}_3 - \hat{L}_2)$$

which is distributed as a chi-square with k degrees of freedom where k is the number of variables in the vector z causing heteroscedasticity. $\hat{L}_2$ and $\hat{L}_3$ are the maximised values of the log-likelihood functions L_2 and L_3 respectively.

Similarly, we construct another likelihood ratio statistic to test for heteroscedasticity in a tobit model.

GLOSSARY

1. ICRISAT Data

TYPE = 1 if the i-th labourer belongs to medium/large farms in the ICRISAT classification
= 0 if the i-th labourer belongs to labour households/small farms in the ICRISAT classification;
PL = 1 if the i-th farm hires some regular labour (SPLHR > 0)
= 0 otherwise;
LNSPLHR = Natural logarithm of total regular labour-hours hired by the i-th farm.
TASK = 1 if the i-th farm hires labour to perform non-monitrorable tasks;
= 0 otherwise
LNCULT = Natural logarithm of the total area cultivated by i-th farm (VLS-Y1 schedule);
LNIRR = Natural logarithm of the area irrigated (VLS-Y1 schedule);
LNFEQVAL = Natural logarithm of the total values of farm-equipments held by the i-th farm (VLS-F schedule)[1];
LNPLOTVA = Natural logarithm of the mean value of the plots per acre belonging to the i-th farm (VLS-Y1 schedule);
LNSFLHR = Natural logarithm of the total number of family labour-hours used in cultivation (VLS-Y2 schedule);
OBUL = 1 if the i-th farm uses its own livestock in cultivation (VLS-Y2 schedule)
= 0 otherwise;
LNFDAY = Natural logarithm of the number of days worked by the i-th labourer on others' farms in a year (VLS-K schedule);
FWNFW = 1 if the i-th labourer performs both farm and non-farm employment in a year (VLS-K schedule)
= 0 otherwise;
LNUNEMP = Natural logarithm of the monthly duration of unemployment;
LNAGE = Natural logarithm of age in years (VLS-C schedule);
LNSQAGE = Natural logarithm of square of age (VLS-C schedule);
ILLI = 1 if the i-th labourer is illiterate (VLS-C schedule)
= 0 otherwise;
CASTE4 = 1 if the i-th labourer belongs to caste group 4
= 0 otherwise (VLS-C schedule).
AUREPALLE = 1 if the i-th farm comes from Aurepalle
= 0 otherwise;
KANZARA = 1 if the i-th farm comes from Kanzara
= 0 otherwise;
YEAR80 = 1 if the i-th observation is from year 1980
= 0 otherwise;
YEAR81 = 1 if the i-th observation is from year 1981
= 0 otherwise;
YEAR82 = 1 if the i-th observation is from year 1982
= 0 otherwise;
YEAR83 = 1 if the i-th observation is from year 1983
= 0 otherwise.

[1]All values are calculated at 1960-61 prices.

2. Resurvey Data from Aurepalle

LNAGE = Natural logarithm of age of the ith labourer in years;
LNSQAGE = Natural logarithm of square of age;
ILLIORN = 1 if the i-th labourer is illiterate
= 0 otherwise[2];
LNFLHOLD = natural logarithm of family landholding of the ith labourer in acres;
IRRORN = 1 if the family-land of the i-th labourer is irrigated
= 0 otherwise;
MALAGA = 1 if the i-th labourer comes from Mala or Madiga household
= 0 otherwise.

3. Unit of Account

a. Land area in acres
1 hectare = 2.4 acres
b. Wage, income and other values in Indian Rupees (Rs.)
c. Age in Years
d. Employment/unemployment in days (unless otherwise stated).

[2]In our sample, most of the labourers are found to be illiterate. Hence, we did not consider the level of educational achievement of these labourers. We thus divide them in two categories only, literate and illiterate.

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