A Model of Mobility of Attached Laborers with Evidence from India*

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Abstract

This paper contributes to the emerging literature on development and institutions by focusing on the institution of attached labor, which is prevalent in the agricultural sectors of several developing countries. It is based upon fieldwork conducted by me in the state of Andhra Pradesh in South India. An attached laborer (sometimes also referred to as "tied-laborer" or "permanent laborer") works for a long period of time for one particular employer, whereas a "casual laborer" usually works on a daily basis. Using a framework of search and matching, I formalize the mobility of attached laborers, which is their ability to leave current employers at the end of the contract, either for other employers or for other occupations. I show that both mobility and duration (the number of continuous periods that the laborer works for the current employer) are negatively related to indebtedness to the employer. In the context of this model, I show that the resulting allocation is generally inefficient. This is an interesting finding because previous literature on attached labor has not addressed its efficiency aspects and because efficiency of institutions matters for development. I extend this model to incorporate the case where employers can make "take-it-or-leave-it" credit offers and show that employers have an incentive to offer credit to impede the mobility of attached laborers. This also strengthens the efficiency result. I then analyze the data from the fieldwork region and show that the empirical findings conform to the predictions of the model.

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1 Introduction

An issue that has been emphasized in the recent development literature is the importance of institutions for the development process (e.g. see Rodrik et. al. (2002), Acemoglu et. al. (2001)). In this literature, it has been persuasively argued that efficiency of institutions matters for development. While many kinds of institutions can be studied, it can be argued that agrarian institutions play a key role in development, and hence their study is crucial. There are several reasons for this, two of them being that agriculture plays a substantial role today in the Less Developed Countries (LDCs) (e.g. see Ray (1998)) and that historically it has played a significant role both in LDCs and in what are developed/industrialized nations today.[1] The study of labor relations in agriculture is required for the above reasons[2] and because several aspects of labor institutions in agriculture are not well understood (see Mukherjee (1998)). Hence, the need for micro studies on agricultural labor in LDCs cannot be overemphasized.

This paper, which is based upon my fieldwork in India, looks at attached labor, an institution prevalent in the agrarian economies of many LDCs (e.g. India, Chile, Brazil). Attached labor, sometimes also referred to as "tied-labor" or "permanent labor" is a situation where a laborer works on a long-term basis for a particular employer. Apart from the observation made above, that the

[1] According to some historians, a major explanation of why Britain industrialized first is that it was the first to have capitalistic agriculture (see Ashton and Philpin(1987)). There are several references on the historical importance of agriculture for LDCs, e.g. Roy (2002).

[2] In this context, it is worthwhile to point out that some historians (e.g. North and Thomas (1973)) have argued that the end of feudal labor institutions was required for capitalism. There are several studies that have analyzed the historical importance of labor institutions in LDCs, e.g. Kumar(1965) and Prakash(1992).

study of labor relations in agriculture is necessary, there are several reasons why the study of attached labor is important. Some of these are - in various forms, it is prevalent in many parts of the less developed world, it has interesting comparative-static properties, and its study can help us conceptualize patronage in the agrarian economy (for a discussion of some of these, see Ray (1998)). While previous theoretical models and empirical work have addressed many aspects of attached labor, there are still some gaps, a major one being that these studies have not considered efficiency implications. This assumes importance in light of the fact that inefficient institutions can hinder development. Efficiency is one of the issues addressed in this study. The specific contributions of the paper are as follows.

First, it explores mobility of attached laborers, which is their ability to leave their employers, either for other employers or for other occupations. The movement of attached laborers from their current employers is a phenomenon that I observed in my field work, and that has been observed by several others (e.g. Sarap (1991), Jodhka (1994)). Attached laborers try to leave their current employers both to exploit more remunerative opportunities and to escape the hardwork and dependence involved in attached labor. They also see this as an expression of their freedom.[3] Understanding the nature and degree of mobility can give us insights into historical changes in the labor process[4] and subjective

[3] Shaffner (1995) gives an example of mobility of attached laborers on sugarcane farms in Brazil, and also argues that workers who moved from attached labor to temporary labor, considered themselves "freed."

[4] For example, Jodhka (1994), Sarap (1991) and Shrivastava (1997) point out to the shortening of tenure and duration of the attached labor contract in India as a result of the mobility of laborers.

feelings of freedom. It can also be argued that the study of mobility is unavoidable if we want to understand certain forms of labor like attached labor, bonded labor and serfdom. This is especially true if the welfare of laborers involved in these arrangements is a concern of policy (in the cases of bonded labor and serfdom, see Genicot (2002)). However, despite its importance, mobility of attached laborers has not been formalized in previous studies.

I hence explore mobility using a search-matching framework where attached laborers start their lives with debt, where the employer is the only source of credit, and where there are limits on the amount that these laborers can borrow. I also assume that the whole debt to the current employer has to be repaid before moving, whereas it can be repaid over the lifetime if the laborer does not move. There is evidence from my fieldwork and other studies (e.g. Binswanger et. al. (1984), Jodhka (1994)) to support this assumption. I show that the higher the debt to the employer, the more unlikely it is that the laborer will move to another employer. I also show that the equilibrium allocation in the model is inefficient under general conditions. In this process, I demonstrate how inefficient institutions can persist and also show that history could matter, in the sense that whether an attached laborer continues to work for the same employer or not depends upon the size of the debt (which the laborer is born with).[5] I extend this model to incorporate alternative sources of borrowing and livelihood and show that the higher the debt, the more unlikely it is that the laborer will move away from the employer, either to another employer or to the

[5] For a recent theoretical model and the relevant literature, see Mookherjee and Ray (2002). History also matters in another sense - the total surplus of the equilibrium allocation and the welfare of the laborer also depend upon the size and distribution of the initial debts.

alternative occupation. In an interesting implication of the model, I consider a case where employers can make "take-it-or-leave-it" offers of credit and show that the result on efficiency is only strengthened.[6] I show that the predictions of the model are borne out by the fieldwork data.

The efficiency result (apart from other results) hinges on imperfections in labor and credit markets and is not related to technology. It is well known that agrarian labor markets are characterized by heterogeneities and imperfections, either due to high search or informational costs.[7] For the above reasons, it is reasonable to use the framework of the matching function.[8] There is also evidence from various contexts to suggest that small farmers and laborers who have no land (and hence no collateral) have very little access to institutional credit. Even large farmers, who lend to small farmers and laborers do not have access to unlimited amount of credit.

Second, apart from formalizing mobility and showing the implications of attached labor for efficiency, the model also captures two other aspects of attached labor. There is evidence from my fieldwork and other studies (see Jodhka (1994), Brass (1999), Binswanger et. al. (1984)) that the availability of financial markets has important implications for the evolution of attached labor. However, only Casselli (see Casselli (1997)), in a theoretical study, considers the impact of financial markets for attached labor. I introduce sources of bor-

[6] As I point out later, there is evidence to suggest such "strategic" lending on the part of employers.

[7] On search costs and informational aspects of labor markets, see Bardhan (1984) and Bardhan (1992) respectively. A related reference which deals with peasant marketing is Geertz (1978).

[8] See Pissarides (2000) p. 3, who points out that "Trade in the labor market is a non-trivial economic activity because of the existence of heterogeneities, frictions and information imperfections."

rowing into my model, on similar lines and explore the consequences of doing so. Another important aspect that is absent from earlier models is strategic behavior. This is surprising because the village economy, which is characterized by long-term relationships and high barriers to exit is naturally conducive to strategic behavior (see Stiglitz (1992)). Moreover, there is evidence of strategic behavior on the part of employers and attached laborers from many parts of the world (see Lacey (1981), pp. 163 from South Africa, Binswanger et. al. (1984) from South India and Breman (1993), pp. 191 from Western India).

There are broadly two classes of models in the theoretical literature on attached labor. In the first class of models, both casual and attached laborers do the same tasks and in the second, these tasks are different.[9] The model in this paper incorporates insights from both classes. Attached laborers and casual laborers perform different tasks as in Eswaran and Kotwal (1985), however, there is no element of patronage and loyalty, which is the thrust of their argument. Mukherjee and Ray (see Mukherjee and Ray (1995)) study the issue of attached laborers entering the casual labor market. But this is because of default and this situation is different from one where laborers choose to leave attached labor at the outset.

The remaining part of the paper is organized in the following manner. The first section gives a brief description of the institutional features of attached labor in the fieldwork region. The second section presents a model that formal-

[9] See Bardhan and Udry (1999) which also presents an excellent survey of the existing literature. Bardhan (1979), (1983), Guha (1989) are some examples of models in the first class, whereas Eswaran and Kotwal (1985) is the seminal model in the second class.

izes mobility among attached laborers and two interesting extensions to this model. The third section describes the data and results from an econometric analysis. The final section concludes by discussing some further implications of the theoretical model and the findings.

2 Institutional Details

I conducted fieldwork in the period 2000-01 in three villages - Gangadevipalli, Machapur, and Kothamolgara, in the Telangana region of Andhra Pradesh state in South India. Gangadevipalli and Machapur are in Warangal district and Kothamolgara is in Mahbubnagar district. The Telangana region is dry, underdeveloped, and has witnessed several agrarian movements, both prior to Indian independence and after it. It has also seen enormous amount of distress in recent years, especially in 1997-98. All the above factors make it an interesting region to study agrarian institutions.[10] Warangal is relatively more developed, irrigated and commercialized than Mahbubnagar.[11] Some details of the villages are presented in Table 1.

There are some differences between the conditions of attached laborers in these two districts and also in the way these contracts are structured and negotiated. However, there are several common features. In both these districts, these laborers are referred to as *jeethagallu*, which literally translates to as

[10] See Qureshi (1937) and Motiram (2002). Vakulabharanam (2003) contains a detailed analysis of development of this region, including macroeconomic performance. It also focuses on some aspects of the agrarian economy of the same villages.

[11] Literacy in 1991 was 39.3 % and 29.5 % for Warangal and Mahbubnagar respectively. The ratio of gross irrigated area to gross cropped area in 1997-98 were 52.02 % and 23.82 % for Mahbubnagar and Warangal respectively.

"people who receive a salary," *jeetham* being the term for salary. My analysis and survey is of laborers involved in annual attached labor contracts only. In Warangal, attached labor contracts of a shorter duration are very rare, while in Mahbubnagar there are some laborers who are involved in such contracts. At the end of the year, the contract is either renewed by the laborer and employer or not. There are two kinds of attached laborers, the first meant to take care of agricultural operations and the second meant to take care of the cattle - buffaloes, cows or sheep (I will refer to the former as agricultural laborers and the latter as shepherds).[12] Sometimes laborers who are primarily shepherds also do a few agricultural operations for a few days.

All the attached laborers are men, whose ages are in the range 10-70 years. Almost all the employers are men and from male headed households.[13] Most of the attached laborers in Warangal are either landless (about two-third) or have marginal land.[14] Only two of them belong to a small farmer household. In Mahbubnagar, attached laborers are largely from landless, marginal and small farmer households. There is one laborer each from a medium farmer and a large farmer household, but in both these cases they had absolutely no irrigated land. The employers are medium or large farmers.

While a laborer works as an attached laborer, he cannot work as a casual laborer, or as an attached laborer for another employer, without the permission

[12] Sarap (1991), Binswanger et. al. (1984), and Krishniah (1998) also report these two kinds of attached laborers.

[13] Hence, throughout the paper, I will use the pronoun "he" to refer to laborers and landlords. However, these should be interpreted in a gender neutral sense.

[14] The Agricultural Census of Andhra Pradesh defines Marginal, Small, Medium and Large households as those with landholdings in the ranges 0-2.5 acres, 2.5-5 acres, 5-10 acres, greater than 10 acres respectively.

of his employer. The employer can however ask the laborer to work for another person and if he wishes, take wages from that person. The laborer's compensation is composed of both monetary and non-monetary portions. The monetary portion is a cash advance, *jeetham*. The non-monetary portion could be footwear, blanket, food provided by the employer, clothes etc. Not all employers provide the above non-monetary items, although almost everyone provides footwear. While the salary, which is a cash advance, can itself be interpreted as a form of interest free credit, laborers also borrow from their employers, in which case, there is an explicit interest charged on this borrowing.

Since, the cash advance is made at the outset, there is a possibility of default. However, there is an institutional mechanism to take care of default. In case a laborer defaults, he has to return all the salary to the employer. The employer might in some cases give consideration to the period for which the attached laborer worked and take back only the cash advance for the portion that the laborer did not work for. In the case of migrant laborers, some person in the village (usually a relative) provides third party guarantee. In case the laborer defaults, the person who provides third party guarantee ensures that the cash advance is repaid. In case a defaulting laborer is indebted to the employer, this debt also has to be cleared. As a result of this mechanism, default is not a very important phenomenon - less than 10 % (9.6 %) of the sample had a past history of default and most of the laborers mentioned that they do not contemplate the possibility of default when they enter into the contract.[15]

[15] In all the cases of default in the sample, either the whole cash advance, or a portion of it was returned to the employer.

3 The Model

There is one good in the economy. There is one period (a year) which is denoted by date 0, and which is divided into slack and peak seasons. There is production of output only during the slack season, and not in the peak season. There is work in both the slack and peak seasons. To make the model simple, it is assumed that there is no uncertainty of output, however this can be incorporated without changing the results.

3.0.1 Laborers and Labor Contracts

There are two kinds of labor contracts - casual labor and attached labor. Casual labor contracts are spot market contracts available in both slack and peak seasons. A laborer and an employer enter into this contract for a certain wage. Attached labor contracts are available only in the slack season. Attached laborers enter into contracts with employers for equal payments in both slack and peak seasons, for work to be performed in both the seasons.[16] Unlike in Mukherjee and Ray (1995), it is assumed that once a laborer enters an attached labor contract, he cannot default on the contract, by working as a casual laborer.[17] The utility function of each attached laborer is assumed to be $U(c_s, c_p) = u(c_s) + \beta u(c_p) - v$ where c_s and c_p are the consumptions in the slack and peak seasons respectively, $u(-)$ is the utility function during the season, β is the seasonal discount rate ($0 < \beta < 1$), and $v > 0$ is the lifetime discounted

[16] This form of the attached labor contract is standard (e.g. see Mukherjee and Ray (1995)) and captures the idea that the contract helps smooth consumption.

[17] This is both because as mentioned above, default is not a significant phenomenon and because it is not the focus of the analysis.

disutility of being an attached laborer. u is assumed to have all the standard properties, i.e. $u' > 0, u'' < 0$. v is a measure of both the intense work done by attached laborers and their dependence upon their employers. The form of the utility function captures the desire to smooth consumption on the part of the laborers and also the disutility from being engaged in attached labor. At the beginning of date 0 there are N attached laborers, who are also indebted to their employers. Since the focus is on mobility and related issues, I will not explicitly model the reasons why the laborers are attached and indebted, and take these as given. Let $D_k > 0$ be the debt of attached laborer k, $k = 1, \ldots, N$.

There is also a pool of casual laborers. The casual wage rate during the slack and peak seasons are exogenous and are denoted by w_s^c and w_p^c respectively. It is assumed that the disutility from attached labor is high enough to dissuade the casual laborers from becoming attached laborers[18] and the debts of the attached laborers are high enough to prevent them from leaving attached labor (and becoming casual laborers).

3.0.2 Landlords and Market Frictions

There are M landlords. In case a landlord has an attached laborer, the laborer can borrow from him, in which case, he charges interest at an exogenous annual rate of R, which is also the opportunity cost of lending for each landlord.[19] We assume that $\beta R < 1$, so that the laborer has the incentive to borrow. The

[18] This is a realistic assumption in many contexts. A precise statement of this assumption is made later, in the discussion on landlords.

[19] This assumption is not required for the results, but is made for ease of exposition because it simplifies the model. This is also a realistic assumption because many studies have pointed out that landlords usually lend at a discount to their attached laborers.

assumptions on the landlords and markets are as given below -

(L1) No landlord can hire more than one attached laborer. At date 0, there are N landlords who have attached laborers and $(M - N)$ who do not. These are denoted by Group 1 and Group 2 respectively.

(L2) The amount a landlord can lend is limited and is in the range $\left[0, \overline{D}\right]$.

(L3) There are frictions in the labor market. If X and Y are the number of laborers and landlords looking for matches respectively, then the number of matches is given by $m(X, Y)$, where m is increasing in both its arguments, concave and homogenous of degree 1.

(L4) Landlords in Group 1 do not search, and the laborers they employ have the option of continuing to work with them at a wage $\overline{w}$. However, attached laborers and landlords in Group 2 search. Once a match is found between an attached laborer and landlord j, the wage that the laborer gets is exogenously given by w_j, where $w_j \in [w_{\min}, w_{\max}]$ with a distribution function G and $\overline{w} < w_{\max}$. If the laborer leaves the current employer, he has to repay the complete debt before doing so, whereas if he continues, he can repay his debt over his lifetime.

(L5) The disutilty from attached labor is high enough to dissuade casual laborers from searching for attached labor contracts, i.e. $u(w_s) + \beta u(w_p) - v < u(w_{\max} + b) + \beta u(w_{\max} - bR)$, where b is the optimal amount borrowed.

(L1) and **(L2)** imply that none of the landlords is "large." We have to note that to hire an attached laborer an employer needs to have the ability to pay wages, and also if possible lend. These are reasonable assumptions, given the fact that usually the sources of borrowing (e.g. institutional sources)

and working capital at the disposal of the landlord are limited. Moreover, in the fieldwork region almost all landlords had only one attached laborer.[20] The matching function in **(L3)** is standard in the literature on unemployment theory (see Pissarides (2000)). There is evidence to support labor market frictions in the agrarian context (e.g. see Bardhan (1984)). **(L4)** is motivated by the fact that since attached laborers at date 0 have worked for their employers in the past, the terms of their contracts are influenced by past variables.[21] What is important for the results below is that $\overline{w}$ is not chosen by the current employers by incorporating the fact that laborers will search with this offer in hand. In the appendix, it will be shown that the results obtained from the model can also be obtained under a weaker condition, and it is not necessary for the wages at which the attached laborers can continue with their respective employers be the same. The distribution of wages for Group 2 is a consequence of heterogeneity of landholdings. w_j can be interpreted as a result of some surplus sharing rule between the landlords and laborers, which can be endogenized given the shares of the laborer and employer.[22] $\overline{w} < w_{\max}$ ensures that attached laborers have an incentive to search.We have to note that the wage policies offered by landlords in Group 1 are different from those offered by landlords in Group 2.

[20] The assumption that the landlords are equal in terms of their lending ability is not required for the results, but is made for ease of exposition. Differences in lending can be introduced without changing the results of the model.

[21] For example, if the laborers had received $\overline{w}$ in the past, then it is realistic to assume that the employers cannot offer wages below this, and so they will offer this wage. This assumption also makes sense because we are primarily looking at a situation where the relationship structured in the past could breakup.

[22] If α is the the laborer's exogenous share of surplus,it is easy to show that corresponding to every α, we can derive a unique wage w_j. The surplus of the employer is the profit he would get in excess of profit from hiring only casual labor and the surplus of the laborer is the utility in excess of the utility from working with the current employer. If $\alpha = 0$ then we have a standard "wage posting" model.

(L5) ensures that even if a casual laborer gets the maximum possible wage, he would still not move to attached labor. This would ensure that casual laborers have no incentive to search for attached labor contracts.

It is worthwhile to reiterate that landlords can always hire casual laborers from a pool that is available to them. The landlords hire casual labor "residually," i.e. after they find out whether they have an attached laborer or not. Also, while landlords can hire only one attached laborer, they can hire all the casual labor that they need. A landlord has access to a technology that can produce $AF^a(L, l_s^c, l_p^c)$ if he has an attached laborer and $AF^c(L, l_s^c, l_p^c)$ if he does not.[23] L, l_s^c, and l_p^c are the land owned, casual labor hired in the slack and peak seasons respectively. $AF^a(L, l_s^c, l_p^c) > AF^c(L, l_s^c, l_p^c)$ indicating the fact that for a particular landlord, for the same amount of casual labor hired in the two seasons, the output is higher if the landlord has an attached laborer as compared to a situation where he does not. This a reflection of the work done by the attached laborer. Let π be the profit of the landlord and it depends upon whether the landlord has an attached laborer or not. In case the landlord has an attached laborer, then his profit from agriculture is represented as $\pi^a(w, w_s^c, w_p^c, A, L_i, \beta)$ where the variables are as defined earlier and w is the wage offered to the attached laborer.[24]

[23] Subscripts are dropped to make the notation less cumbersome. It has to be noted that the specification of the technology holds for all the landlords, Group 1 and Group 2.

[24] The assumption that the discount rate for the landlords is the same as the one for attached laborers (β) is made for ease of exposition and is not required for the results.

$$\pi^a(w, w_s^c, w_p^c, A, L_i, \beta) = \quad Max \left[\beta A F^a(L, l_s^c, l_p^c) - (w + \beta w) - (l_s^c w_s^c + \beta l_p^c w_p^c)\right]$$

$$\{l_s^c, l_p^c\}$$

Note that output is produced in the peak season only. $(w+\beta w)$ and $(l_s^c w_s^c + \beta l_p^c w_p^c)$ are the payments made to the attached laborer and casual laborers respectively. In case the landlord does not have an attached laborer, then his profit is given by $\pi^c(w_s^c, w_p^c, A, L, \beta) =$

$$Max \left[\beta A F^c(L, l_s^c, l_p^c) - (l_s^c w_s^c + \beta l_p^c w_p^c)\right]$$

$$\{l_s^c, l_p^c\}$$

It is realistic (given the interpretation of a surplus sharing rule) to assume that the wages paid to attached laborers are such that the employers get positive surplus from hiring them, i.e.$\forall w \in [w_{\min}, w_{\max}]$ and $w = \overline{w}$, $\pi^a(w, w_s^c, w_p^c, A, L_i, \beta) > \pi^c(w_s^c, w_p^c, A, L_i, \beta)$. In other words, given the range of wages for attached labor, it is always profitable to hire an attached laborer. Let the casual labor demand functions for the landlord in the cases where he has an attached laborer and where he does not be $CL^a(w, w_s^c, w_p^c, A, L, \beta)$ and $CL^c(w_s^c, w_p^c, A, L, \beta)$ respectively. These are the solutions to the above problems and are vectors because the landlord hires casual labor in both the slack and peak seasons.

4 Equilibrium and Results

The timing and sequence of events is as follows. (i) Attached laborers and employers in Group 1 search for matches. (ii) Matches are found and those laborers with successful matches (where the wage is higher than the reservation wage and the laborer can obtain enough credit) leave their current employers and the remaining continue. The equilibrium corresponds to a situation where,

(i) Attached Laborers maximize their utility. (ii) Landlords in Group 1 maximize their profits based upon whether they have an attached laborer or not. (iii) Landlords in Group 2 maximize their profits. (iv) In the attached labor market, laborers and employers in Group 2 search and if a match is successful, the laborer moves, otherwise he does not.

The equilibrium is defined as the sequence $(i = 1 \dots N, j = 1 \dots (M-N), k-1 \dots N)$,

$((p_i^1, \overline{w}, CL_i^a(w, w_s^c, w_p^c, A, L_i, \beta), CL_i^c(w_s^c, w_p^c, A, L_i, \beta)),$

$(p_j^2, w_j, CL_j^a(w, w_s^c, w_p^c, A, L_i, \beta), CL_j^c(w_s^c, w_p^c, A, L_i, \beta)), (p_k^l, w_k, b_k))$

The first term is for landlords in Group 1, who have attached laborers at date 0. p_i^1 is the probability that landlord i will retain his attached laborer, the remaining terms are the wage paid to the attached laborer, casual labor hired in case the employer retains his attached laborer, and the casual labor hired in case the employer does not retain his attached laborer. The second term in the sequence corresponds to landlords in Group 2. p_j^2 is the probability that the landlord j finds an attached laborer and w_j is the wage offered. The third term in the sequence corresponds to the attached laborers. p_k^l is the probability that

the attached laborer k moves, w_k is the wage that the laborer gets. We have to note that $w_k = \overline{w}$ in case the laborer stays with the current employer, and in case he moves, w_k depends upon the landlord that the laborer matches with. b_k is the amount the laborer borrows in the slack season.

Let w^R be the wage that the attached laborer needs to draw from a prospective new employer, so that he is indifferent between continuing with the current employer and moving to the new employer. Let w be the wage that the laborer draws from a new employer. If $w \leq w^R$ the laborer would continue with the current employer, otherwise he would move. w^R is in a sense a "reservation wage." Let $v(D)$ be the utility of the laborer if he continues with the current employer, which is the solution to,

(A) $Max\left\{u(c_s) + \beta u(c_p)\right\}$ s.t. $c_s \leq (\overline{w} + b), c_p \leq (\overline{w} - (b + D)R), -D \leq b \leq \overline{D}$

Let $v^n(w, D)$ be the utility of the laborer if he moves to another employer, which is a solution to,

(B) $Max\left\{u(c_s) + \beta u(c_p)\right\}$ s.t. $c_s \leq (w+b-D), c_p \leq (w-bR), -D \leq b \leq \overline{D}$

This can be rewritten in terms of net-borrowing, $\widetilde{b} = (b - D)$, as

(C) $Max\left\{u(c_s) + \beta u(c_p)\right\}$ s.t. $c_s \leq (w + \widetilde{b}), c_p \leq (w - (\widetilde{b} + D)R), 0 \leq \widetilde{b} \leq (\overline{D} - D)$

Note that **(B)** and **(C)** are identical except for the borrowing constraint in **(C)** which is stronger. However, this would matter iff the optimal amount of borrowing in **(A)**, b^*,is greater than $(\overline{D} - D)$, i.e. if $u'(\overline{w} + \overline{D} - D)$-$\beta R u'(\overline{w} -$

$\overline{D}R) > 0$. This condition can be rewritten as $D > D^*$, where D^*, the threshold above which debt becomes important for movement, is given by $u'(\overline{w}+\overline{D}-D^*)$-$\beta R u'(\overline{w} - \overline{D}R) = 0$.

Proposition 1 *If* $D_i > D^*$ *then* $\partial p_i^l / \partial D_i < 0$

The above proposition says that for a laborer whose debt is above the threshold, the higher the debt, the less likely it is that he will move to another employer. The intuition for the above result is that if debt is in the range where the borrowing constraint becomes binding when moving to the new employer, as debt increases the borrowing constraint becomes more and more restrictive. Hence the wage from the new employer has to be higher to induce the laborer to move. We have to note that the above Proposition does not say anything about two different laborers in equilibrium because they could have two different wage offers from their current employers. However this is ruled out by **(L5)** and hence the proposition below immediately follows.

Proposition 2 *In equilibrium, for laborers i and j, if* $D_i > D^*$ *and* $D_i > D_j$ *then* $p_j^l > p_i^l$

Proof. The proof follows from Proposition 1 and **(L5)** ■

Note that the size of D_j relative to D^* does not matter. This is the main result of the model, that if there are limits to borrowing, then in equilibrium, laborers with lower debts are more likely to move as compared to those with higher debts (if these debts are large enough). This result also illustrates the idea that as long as laborers can maintain small debts to their employers, they can move.

4.1 Efficiency

The implications of the above analysis for efficiency can be illustrated by considering a situation where there is one laborer who is searching for a new employer. The borrowing constraint, coupled with the fact that the laborer has to repay the entire debt before leaving, implies that the laborer cannot move to certain employers who are more productive than the current employer, and hence the total surplus (and total output) in the economy is lower than what it could be. Let the present scenario (where the borrowing constraint is binding) be denoted as Scenario 1. Let Scenario 2 be a situation where there are no constraints on borrowing or where the current employer does not insist that the laborer pay off the complete debt before leaving. Under Scenario 2, the probability that the laborer would leave is $\frac{m(N,(M-N))}{N}(1 - F(\overline{w}))$ because he just needs a wage higher than $\overline{w}$ to leave. Since the wage distribution is derived from some surplus sharing rule, it is natural to assume that higher surpluses and higher outputs are correlated with higher wages. Under Scenario 1, the probability that the laborer would leave is $\frac{m(N,(M-N))}{N}(1 - F(w^R))$ where $w^R > \overline{w}$ (and $(1 - F(\overline{w})) > (1 - F(w^R))$). Hence, the probability that the laborer will move to an employer where the surplus is higher (than the surplus from the current employer) is lower under Scenario 1 as compared to Scenario 2. This in turn means that the expected total surplus under Scenario 1 is lower than that under Scenario 2, which implies that the allocation under Scenario 1 is inefficient. Hence, one of the major consequences of the attached labor system, when there are borrowing constraints, and when the laborer has to repay the

whole debt before moving, is that it promotes inefficiency.

5 Extensions

5.1 Alternative Source of Credit

So far we have been concerned only with movement from one employer to another, because the only source of credit is the employer. To explore the possibility of leaving attached labor, I will introduce an alternative source of borrowing on the lines of Casselli (1997). In reality, to a certain extent the laborer can borrow from sources like relatives, local moneylenders. However, usually, these sources are either limited or the interest rate on these is very high. Also, alternative sources of borrowing are very uncertain in the sense that the laborer does not know the amount he can borrow. In some cases, this alternative source of credit is related to the occupation the attached laborer moves to (e.g., see Breman (1984)). Assume that apart from the employers, there is another source of borrowing, which is uncertain and costlier. The rate of interest on this outside source is θR, where $\theta >1$. As in Casselli (1997), θ also captures the transaction costs involved in outside borrowing. To capture the uncertainty involved in the outside option, we assume that the maximum amount that the laborer can borrow from this source, B follows the distribution $H(B)$ defined on $\left[0, \overline{B}\right]$. To keep matters simple and to make things more realistic, it is assumed that this outside source is not available to smooth consumption in case the laborer remains attached.

There is an alternative occupation (AO) at the disposal of the laborer, in case he can leave attached labor.[25] Let the income streams associated with this option be I_s and I_p in the slack and peak seasons respectively. Now the laborer can consider three options- (i) Stay with the current employer (ii) Move to another employer (iii) Move to (AO). In other words, with the current employer's offer in hand, he can try to either leave attached labor, or to find a new employer, or both. To make the analysis simple, I focus on the case where (AO) is always better than working as an attached laborer, if it is possible to obtain enough credit.[26] The sequence of events is as follows - (i) Each laborer finds out the maximum amount that he can borrow from the outside source of credit. In case the laborer gets enough credit to repay his current employer, he chooses the amount to borrow, repays the debt to the current employer and leaves attached labor. (ii) Once the above process ends, there are some laborers left. These laborers and the landlords, continue the search process outlined in the case where there was no outside source of credit.

The utility of a laborer with debt D if he can move to (AO) and if he continues as an attached laborer are denoted by $v_{AO}(I_s, I_p, D, \theta)$ and $v_{AL}(D)$ respectively. By assumption $v_{AO}(I_s, I_p, D, \theta) > v_{AL}(D)$, $\frac{\partial v_{AO}}{\partial \theta} < 0$ and $\frac{\partial v_{AO}}{\partial D} < 0$. For laborer k, we will represent the probability that he can leave attached labor by q_k^l.

[25] Examples of this could be working in a town, migrating to another village; casual labor, tenancy etc (see Sarap (1991), Breman (1993) for such alternatives in some contexts). In my fieldwork, attached laborers suggested some alternatives like traditional occupation, education, apart from casual labor.

[26] This is the most realistic assumption, given the disutility involved in attached labor.

Proposition 3 $D_i > D_j \Longrightarrow q_j^l > q_i^l$

5.2 Credit Offer to Retain the Attached Laborer

An interesting implication of the above model is that since the attached laborer's debt hinders his mobility, if the employer can control the laborer's debt, he has the incentive to do so. We formalize this idea in the following manner by considering the problem of a typical laborer and a typical employer.

Consider the model without outside credit, but with two periods. At date 0, the laborer is working for the employer and he has no other option, but to work for the employer. At date 1, the world is the same as in the previous model, where the laborer has the option of working for the employer or moving to a new employer. Since we do not have outside credit, the possibility of leaving attached labor does not arise at date 1. At date 0, the laborer has no debt to the employer, but the employer can make a "take-it-or-leave-it" offer of credit so that the laborer has some debt outstanding at date 1, which in turn affects his probability of leaving. At date 0, in the slack season, the employer makes a "take-it-or-leave-it" offer of credit and the laborer either accepts the offer or rejects it. In the peak season, the laborer returns some portion of the borrowing (including interest) made in slack season. He could return the whole amount or return nothing.

5.2.1 Laborer's and Employer's Problems

At date 0, in case the laborer takes the credit offer, he will take into account the fact that he has the chance to move at date 1, and the amount of debt

he has at date 1 hinders his ability to do so. Since the employer lends at his opportunity cost, he makes no profit or loss from lending. So, he is indifferent about lending any amount. However, he chooses the amount to lend for "strategic" purposes, i.e. because it helps him to keep the laborer from moving. Suppose the employer makes an offer B. We will first consider the situation where the laborer accepts the offer. Let b^* be the amount that the laborer returns in peak season at date 0, it could be 0, but it cannot be negative. The debt at the beginning of date 1 is $D = (BR - b^*)R$. In case the laborer accepts the offer, the laborer's expected utility at date 0 is given by $u(\overline{w}+B)+\beta u(\overline{w}-b^*)+\beta\left[P(D)v(D)+(1-P(D))Ev^n(w,D))\right]$. The first and second terms are the utilities in the slack and peak seasons of date 0. The third term is the expected utility during date 1. With a probability $P(D)$, the laborer stays with the current employer, in which case he gets a utility $v(D)$, and with a probability $(1-P(D))$ the laborer moves, in which case he gets an expected utility of $Ev^n(w,D)$. In case the laborer rejects the offer, the laborer's expected utility is given by $u(\overline{w})+\beta u(\overline{w})+\beta[P(0)v(0)+(1-P(0))v^n(w,0))]$. If the laborer rejects the offer, he has zero debt at date 1 and hence the probability that he will stay with the current employer is given by $P(0) = F(\overline{w})$. When the employer makes the offer, he should ensure that the expected utility of the laborer from accepting the offer should be higher than that from rejecting it. Therefore the offer of the employer is such that,

$$u(\overline{w}+B)+\beta u(\overline{w}-b^*)+\beta\left[P(D)v(D)+(1-P(D))v^n(w,D))\right] \geq u(\overline{w})+\beta u(\overline{w})+\beta\left[P(0)v(0)+(1-P(0))v^n(w,0))\right]$$

The above is the participation constraint for the laborer. One possible

scenario for the participation constraint is as shown in Figure 1. The straight line and the curve represent the expected utilities from rejecting and accepting the employer's offer respectively. The employer's profit from making the offer is given by,

$$\pi^a(\overline{w}, w_s^c, w_p^c, L, A)+\beta\left[P(D)\pi^a(\overline{w}, w_s^c, w_p^c, L, A) + (1 - P(D))\pi^c(w_s^c, w_p^c, L, A)\right]$$

We have to note that since the employer lends at his opportunity cost, his profit does not depend upon the amount that he lends. Note that $\pi^a(\overline{w}, w_s, w_p, L, A) > \pi^c(w_s, w_p, L, A)$ otherwise the employer will not hire the attached laborer at wage $\overline{w}$, which implies that the employer's profit is increasing in $P(D)$. Hence, it is in the interest of the employer to ensure that $P(D)$ is as high as possible. Since $P(D)$ is non-decreasing in D (and increasing in $D \in \left[D^*, \overline{D}\right]$), it is in the interest of the employer to offer as much credit as possible while keeping the participation constraint satisfied.

If we consider the case where the laborer has no option but to work for the employer, i.e. if he cannot move at date 1, then we can observe that in this case, the employer is indifferent to the amount lent. This is because the employer does not make any profit or loss from lending. He can even lend the amount that the laborer would have borrowed, in case the laborer is allowed to borrow as much as he wants (subject of course to the credit constraint). Let B be the offer chosen by the employer and $\widehat{B}$ be the amount the laborer would have chosen if he had the option of choosing the amount to borrow.

Proposition 4 $B \geq \widehat{B}$

The proposition above clearly demonstrates that when the employer has the

bargaining power in the credit market, he can use it to affect the mobility of the attached laborer. It also shows that in this situation, the employer has an incentive to "over lend," i.e. lend more than what the laborer would have wanted to borrow, and also lend more than what he would have lent in case there are no other competitors for the attached laborer.

While the above result hinges on the fact that R is equal to the opportunity cost of the employer, it can be easily extended to other situations where R could be different. In case R is lower than the opportunity cost (so that the employer offers credit at a discount) then the employer makes a loss from lending. In this case there is a trade-off between profit from keeping the attached laborer and loss from lending, and we can easily characterize the conditions under which the result can be obtained. In case R is higher than the opportunity cost, the employer makes a profit from lending and the result is strengthened. This is because the employer has two incentives to lend more - profit from lending and increasing the profitability of keeping the laborer.

5.3 Efficiency

Let us compare two scenarios - Scenario 3 and Scenario 1, corresponding to situations where the current employer can make credit offers and where he cannot. From the above analysis, it is clear that the probability that the laborer moves under Scenario 3 is lower than that under Scenario 1. This would imply that the expected total surplus under Scenario 3 is lower than that under Scenario 1 because under 3 there is a lower likelihood that the laborer would move to an employer who has a higher productivity. Hence, Scenario 3 is less efficient

than Scenario 1. Since, Scenario 1 is less efficient than a situation where there are no constraints on borrowing, or where the employer does not insist that the laborer pay off the debt before leaving (which was called Scenario 2 in the basic model) the efficiency result that was derived in the basic model is only strengthened.

5.4 Data and Estimation

The data set is for the agricultural year 2000-01 and includes 62 laborers, 40 of whom are primarily agricultural and the remaining 22 primarily shepherds. Some important variables and their descriptive statistics are given in Table 2. Debt and credit details are presented in Tables 3 and 4. In the last few years, there has been a new arrangement called *bayana* (which literally means a guarantee) in the villages in Warangal, wherein an employer and a laborer enter into an attached labor contract for the next year. In most cases, the salary and other aspects of the contract are agreed upon at the time of *bayana*, while in the other cases, the employer tells the laborer that these will be decided later, after looking at the "going" salaries for the next year. This arrangement reflects the high demand for attached laborers in Warangal, and according to both employers and laborers, has arisen in order for the employers to assure themselves of attached laborers for the next year. Given the fact that Mahbubnagar is relatively underdeveloped, it is not surprising that such an arrangement is absent there. There is data from Warangal on attached laborers who either moved to other employers or who left attached labor.

In order to test the model, two estimations are performed, one on mobility and the other on the duration the laborer spends with the employer. The results from these estimations are presented in Tables 5 and 6. From these results, it is clear that what matters for both mobility and duration is debt to the employer (EMPDBT). From Table 7, we can observe that the average EMPDBT is much higher for those who continued with the employers as compared to the same for those who did not. Similarly it is much higher for those who have been working for longer than an year as compared to the same for those working for less than an year. In the estimation of DUR, we can note that the coefficient of borrowing from the employer (EMPBOR) is negative and significant. This has an interesting interpretation. We have to note that when DUR=0, this implies that the laborer has moved from another employer or from casual labor to the current employer this year. The negative and significant coefficient on EMPBOR indicates that the higher the credit from the employer, the more likely it is that the laborer will move to the current employer. This is quite intuitive because the need for credit is one of the important motivations for entering into this arrangement. In fact, as we can observe from Table 7, the average amount borrowed by the laborers who continued with the current employers (DUR=1) is much lower than the same for laborers who moved to their employers.

6 Conclusions

The model developed in the paper has been able to formalize mobility, an interesting feature characterizing attached labor in many contexts. In this process it has thrown light on the implications of the contract for efficiency. In what follows, I will conclude by exploring some of the implications of the model and by discussing the applicability of the model to other contexts.

In the analysis of efficiency, I have looked at the case where if a laborer matches with a more productive employer and the transfer cannot occur because of inadequate credit, there is no alternative mechanism through which the more productive employer can get the laborer. For example, the more productive employer cannot promise output to the current employer in return for his allowing the attached laborer to leave. This assumption is not needed for the efficiency result. Even if there is a mechanism that can ensure a transfer, this mechanism has to be costless. If there is a cost involved in the more productive employer transacting with the current employer, as it is realistic to assume, the efficiency result would still obtain.

In the case where the employer makes take-it-or-leave-it credit offers, the focus of the discussion was on attached labor contracts, however this can be extended to a situation where a casual laborer has to borrow from a landlord in the first period, with the possibility of his working as an attached laborer in the second period. In a context where there is high demand for attached labor, both the scenarios, the one analyzed in this model and the one pointed out above are quite plausible. The attempts by farmers to provide advances to

assure themselves of attached laborers for the next year is in the spirit of the analysis above, although the above phenomenon has to be investigated more systematically. More direct evidence has been pointed out in other contexts, e.g. see Brass (1999), Jodhka (1994).[27]

The empirical and theoretical analysis in this paper could have implications for situations other than attached labor where indebtedness and availability of credit play an important role.[28] However, the concrete situation facing attached laborers is very different from indebted workers in non-agrarian settings, especially in advanced capitalist economies. One important difference is that the latter are protected by the law against losing their future earnings to lenders, whereas the former cannot imagine such protection (see Rao(1999)).

Appendix I: Proofs

Proposition 1

Proof. $u(w^R+\overline{D}-D)+\beta u(w^R-\overline{D}R) = u(\overline{w}+b^*)+\beta u(\overline{w}-(b^*+D)R)$ where b^* is the optimal borrowing in **(A)**. $D > D^* \Longrightarrow b^* > (\overline{D}-D)$. Hence $(\overline{w}-(b^*+D)R) < (\overline{w}-\overline{D}R) < (w^R-\overline{D}R)$ and from the above equality, $(w^R+\overline{D}-D) < (\overline{w}+b^*)$. If b^* is interior then $\frac{\partial w^R}{\partial D} = \frac{u'(w^R+\overline{D}-D)-\beta R u'(\overline{w}-(b^*+D)R)}{u'(w^R+\overline{D}-D)+\beta u'(w^R-\overline{D}R)} . \frac{\partial w^R}{\partial D} > 0$ follows from the F.O.C of **(A)** and $(w^R+\overline{D}-D) < (\overline{w}+b^*)$. If b^* is at a corner, the proof is similar. ■

[27] Jodhka points out from Haryana state in North India that, "And interestingly the farmers who had been advancing credit on a regular basis also reported that they advanced to landless mainly with the intention of tying them for attached or peak season labour."

[28] An interesting example is provided in Datta and Nugent (1985), which deals with pearling industry in Bahrain.

Proposition 2 could hold when the wage offers from continuing with the current employers are different.

Proof. Let $\overline{w}_i(\overline{w}_j)$, $D_i(D_j)$, $D_i^*(D_j^*)$ and $w_i^R(w_j^R)$ be the wage from continuing, debt, threshold debt and reservation wages respectively of laborer $i(j)$. The probablilities that i and j move are $p_i^l = \frac{m(N,(M-N))}{N}\ (1 - G(w_i^R))$ and $p_j^l = \frac{m(N,(M-N))}{N}(1 - G(w_j^R))$. Let $D_i > D_j$ and $D_i > D_i^*$. If $\overline{w}_i > \overline{w}_j$, then $w_i^R > w_j^R$ and $p_i^l < p_j^l$, which implies that Prop 2 holds. If $\overline{w}_i < \overline{w}_j$, while i is more likely to find a better wage, he would have to repay a higher debt. For Prop 2 to hold, the impact due to debt has to dominate the impact due to the wage, or $(\overline{w}_j - \overline{w}_i)$ is small compared to $(D_i\text{-}D_j)$. The limiting case is $(\overline{w}_i - \overline{w}_j) = 0$, which is the case considered in the analysis. ■

Proposition 3

Proof. $q_k^l = 1 - H(D_k)(1 - \frac{m(N',(M-N))}{N'}G(w_k^R)), k = i, j$, since the laborer will stay with the current employer only if he cannot move either to (AO) or to a new employer. Note that $N' \neq N$ because some laborers leave attached labor after the first stage. The result follows from $\frac{\partial H}{\partial D_k} > 0$ and $\frac{\partial w_k^R}{\partial D_k} \geq 0$. ■

Proposition 4

Proof. At $\widehat{B}$, the Participation Constraint (**PC)** is slack. If $\widehat{B} < \overline{D}$, the employer can increase the offer (B) above $\widehat{B}$ and still keep **PC** slack. He has an incentive to do so because he wants to lend the maximum possible. Hence, if $\widehat{B} < \overline{D}$ then $B > \widehat{B}$. If $\widehat{B} = \overline{D}$, then the employer cannot increase the offer beyond $\widehat{B}$ and would therefore set $B = \overline{D}$. Hence $B \geq \widehat{B}$. ■

Appendix II: Tables and Figures

Table 1: Some Details of the Field Work Villages

	Gangadevipalli	Machapur	Kothamolgara
Type of Household[1]			
Large Farmer	7	1	32
Medium Farmer	30	23	68
Small Farmer	56	138	168
Marginal Farmer	66	197	279
Landless	82	194	6
Crops grown	Cotton, Maize, Paddy, Turmeric, Chillies, Vegetables	Cotton, Maize, Paddy, Turmeric, Chillies, Vegetables	Castor, Millets, Cotton Jowar, Cotton Seed
Castes present	Mostly Other Backward Castes (OBC)	Mostly OBC, Scheduled Castes (SC)	Mostly Forward Castes , OBC and SC
Sources of Irrigation[2]	Tube Well, Rainfall and Tank	Tube Well, Rainfall and Tank	Bore Well, Rainfall

Table 2: Descriptive Statistics for Some Variables[3]

Variable	Mean	Std. Dev.	Min	Max
AGE (Age in years)	32.09677	15.7498	10	75
HHSIZE (Size of the Household)	4.66129	1.837171	2	12
DEPRATE (Dependents as a proportion of HHSIZE)	.2974334	.210774	0	.714285
TOTLAND (Total Land in Acres)	.9699597	1.830946	0	10
PERCAPL (Per capita Land of the Household)	.1938332	.3775028	0	2.5
TOTDBT (Total debt at the beginning of the year in Rs.)	24572.58	16061.93	0	62500
EMPDBT (Debt to employer at the beginning of the year in Rs.)	4487.581	7064.8	0	40000
TOTBOR (Total Borrowing during the year in Rs.)	7129.032	8443.61	0	30000
EMPBOR (Borrowing from employer during the year in Rs.)	2709.677	4778.322	0	30000
REMUN (Total monetary value of Remuneration in Rs.)	10030.81	3810.89	2050	15360
SALARY (Cash Advance in Rs.)	9540.323	3988.363	1000	15000
CONTYRS (Continuous years with the employer, 0 if first year)	1.354839	1.765765	0	9
EXP (Experience in Years)	12.74194	12.61269	0	60
DUR (1 if worked for employer for more than one year)	0.516129	0.5038194	0	1
SWENY (1 if moved from employer next year)	0.5	0.5063697	0	1
SCORST (1 if belongs to Scheduled Caste or Tribe)	0.3548387	0.4823703	0	1
AGRLAB (1 if primarily Agricultural Laborer)	0.6451613	0.4823703	0	1
DISTDUM (1 if district is Mahboobnagar)	0.2741935	0.4497487	0	1
MIG (1 if Migrant)	0.1935484	0.3983042	0	1
PASTDEF (1 if defaulted in the past)	0.0967742	0.2980636	0	1

[1] The Agricultural Census of Andhra Pradesh defines Marginal, Small. Medium, Large households as those with landholdings in the ranges 0-2.5 acres, 2.5 acres-5 acres, 5 acres-10 acres, greater than 10 acres respectively.
[2] In Mahbubnagar district, most of the wells have dried up and there is very little rainfall. In Gangadevipalli and Machapur villages, there is a tank, but it provides water only to a few fields.
[3] Data for SWENY is available only for Warangal. There are 5 missing values for SWENY.

Table 3: Details of Borrowing by Attached Laborers

	Warangal	Mahbubnagar
Average amount borrowed from employers (Rs.)	2644.444	2882.353
Average amount borrowed from non-employers (Rs.)	3422.222	7058.823
Average amount borrowed from all sources (Rs.)	6066.666	9941.177
Average (modal) interest rate charged by employers (per annum)	30 %[4]	18 %
Average (modal) interest rate charged by non-employers (per annum)	30 %	36 %
Purpose of Borrowing from employers (% of total laborers in district)[5]		
Medical	6.67 %	
Interest on or repayment of other debt	11.11 %	11.76 %
Household Expenses	8.89 %	11.76 %
Marriage in the family	4.44 %	5.88 %
Others (House, Production Loan, etc.)	6.67 %	
Purpose of Borrowing from nonemployers (% of total laborers in district)[6]		
Medical	2.22 %	
Interest on or repayment of other debt	2.22 %	
Household Expenses	4.44 %	17.65 %
Marriage in the family	8.88 %	29.41 %
Others (House, Production Loan, etc.)	8.88 %	23.53 %

Table 4: Debt Details of Attached Laborers

Reasons for entering into debt[7] (% of total laborers in district)		
Medical	17.78 %	
Marriage in the family	26.67 %	23.53 %
Death in the Family	8.89 %	
House Construction	22.22 %	23.53 %
Others (Household Expenses, Crop Loss, Buying Buffaloes, etc.)	26.67 %	11.76 %
Average Total Debt (Rs.)	27031.11	18064.71
Average Debt to employers (Rs.)	4486	4491.765

[4] About 50 % of the employers charged an interest rate of 2.5 % per month or 30 % per annum.
[5] The numbers do not add up to 100 because there are some laborers who did not borrow from the employer.
[6] Laborers who borrow for more than one purpose are counted under all the heads. The numbers do not add up to 100 because there are some laborers who did not borrow from non-employers.
[7] Laborers who went into debt for more than one purpose are counted under all the heads. The numbers do not add up to 100 because there are some missing values.

Table 5: LOGIT Analysis of the Probability that an Attached Laborer Moves from the Current Employer Next Year

Variable	Gangadevipalli		Warangal	
	(1)	**(2)**	**(1)**	**(2)**
AGE		-0.131		0.009755
		(0.0821)		(0.0295)
DEPRATE		15.829		1.3753
		(10.945)		(2.772)
PERCAPL		-7.833		-4.5498
		(5.895)		(4.126)
MIG		5.123*		1.5450
		(2.966)		(1.43)
TOTDBT	0.0000506	0.0001786	0.0000463	0.0000596
	(0.0000375)	(0.0001128)	(0.0000329)	(0.0000388)
EMPDBT	-0.0003139**	-0.0007771*	-0.0003113**	-0.000287**
	(0.0001469)	(0.0004636)	(0.0001262)	(0.0001389)
TOTBOR	0.000176	0.0008916	0.0000684	0.0000117
	(0.0002151)	(0.0006499)	(0.0000768)	(0.0001035)
EMPBOR	0.0001495	-0.0002124	0.0002842	0.000376
	(0.0003219)	(0.0007305)	(0.0001891)	(0.0002783)
SCORST				1.413142
				(1.383565)
AGRLAB		0.592		0.5432
		(1.792)		(1.8636)
INTERCEPT	-1.430723	-5.988368	-1.111693	-2.896585
	(1.079464)	(4.636735)	(0.8864035)	(1.863672)
No. of Observations	31	31	40	40
Chi^2 (Prob > Chi^2)	14.24 (0.0066)	27.43 (0.0012)	18.79 (0.0016)	21.26 (0.0019)

* Significant at 10 % level. ** Significant at 5 % level

Table 6: LOGIT Analysis of the Probability that an Attached Laborer Works for an Employer for More than 1 Year (Continuously)

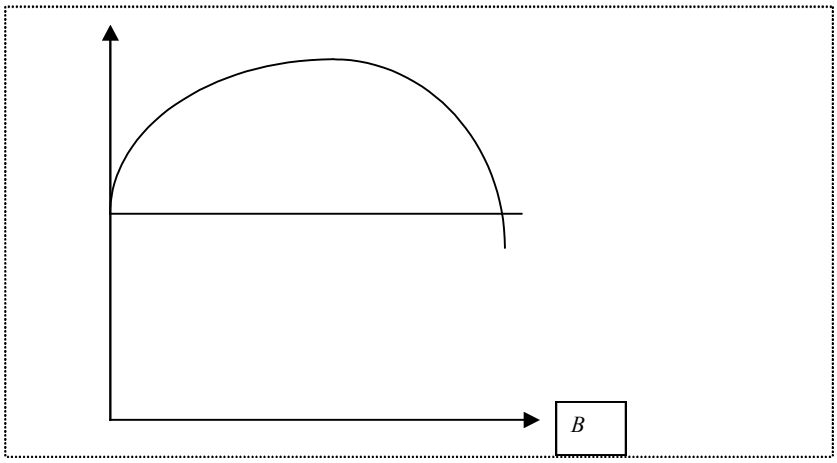
Variable	Gangadevipalli	Warangal	Total Sample
SCORST		-0.746	-0.754
		(0.755)	(0.6315)
TOTDBT	$-3.03 * 10^{-6}$	0.000185	-0.0000106
	(0.000036)	(0.0000235)	(0.0000206)
EMPDBT	0.0005019**	0.0001101*	0.0001156**
	(0.0002191)	(0.0000594)	(0.0000514)
TOTBOR	0.0001085	0.0000356	0.000047
	(0.0001233)	(0.0000616)	(0.0000433)
EMPBOR	-0.0003727	-0.0003067**	-0.0003184**
	(0.0002404)	(0.0001418)	(0.0001169)
DISTDUM			-.3263466 .
			(0.7120034)
INTERCEPT	-0.071072	-0.5083551	0.6399853
	(0.772774)	(0.9470211)	(0.7547176)
Number of Observations	33	45	62
Chi^2 (Prob > Chi^2)		12.41 (0.0296)	15.87 (0.0145)

* Significant at 10 % level. ** Significant at 5 % level.

Table 7: Average Employer Debt/Borrowing and Mobility of Attached Laborers in Warangal

Average EMPDBT of laborers who stayed with the current employer	Rs. 7540
Average EMPDBT of laborers who moved to another employer	Rs. 2422.5
Average EMPDBT of laborers who moved away from attached labor	Rs. 250
Average EMPDBT of laborers for whom DUR=1	Rs. 6348.75
Average EMPDBT of laborers for whom DUR=0	Rs. 2502.33
Average EMPBOR of laborers for whom DUR=1	Rs. 1406.25
Average EMPBOR of laborers for whom DUR=0	Rs. 4100

Figure 1: Participation Constraint of the Laborer



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