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Wages and involuntary unemployment in the slack season of a village economy*

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We model slack season wages in a village economy, in the presence of involuntary unemployment. Our model draws its inspiration from sociological notions of 'everyday peasant resistance'. In particular, labourers can react to employers who pay low slack wages by refusing to work for them in the relatively tight peak season. Such refusals, however, are not automatic and are modelled endogenously. A continuum of equilibrium wage configurations is obtained. These configurations, barring one, involve wages exceeding reservation wages, despite the presence of involuntary unemployment. Several qualitative observations follow. These are examined with respect to available empirical data, in particular, the village survey of Palanpur.

1. Introduction

An important feature, characteristic of Indian agriculture, is the downward rigidity of casual labour wages despite the existence of widespread involuntary unemployment. There is a large body of empirical literature that has highlighted this feature, and a number of theoretical models are relevant in the present context. The interested reader is referred to Drèze and Mukherjee (1989) for an extensive survey, and to the many references cited there.

We reject simplistic explanations based on tradition and custom, for those beg the question of how an 'acceptable wage', or the limits to an acceptable wage are determined. Nor is an explanation relying on the notion of minimum subsistence level very illuminating. For one thing, there is sufficient evidence to suggest that the wage exceeds some notion of the labours' *reservation* wage (see section 2 below). Moreover, it is not clear whether

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minimum subsistence is even a well-defined concept, especially in the context of casual labour.[1]

Bardhan (1984) has appproached the problem in terms of recruitment costs. While it is a highly perceptive model, it suffers from the assumption of a monopsonistic labour market. We do not believe monopsony is the all-pervasive truth in the Indian context. Similarly, a caveat applies to nutrition based efficiency wage models [see, e.g. Mirrlees (1976), Bliss and Stern (1978), Dasgupta and Ray (1986)]. In casual short-term labour markets, the nutrition-efficiency nexus, which is really a relation operating over time, may fail to be fully internalized.

Our purpose here, however, is not to critically evaluate various theoretical developments,[2] but to provide an alternative conceptual approach which appears to be an equally strong contender, especially in the context of casual labour markets. Our detailed analysis is based on a postulate of '*everyday peasant resistance*', a concept that has gained currency in the sociological literature (a recent example is the special issue on 'Everyday Forms of Peasant Resistance', *Journal of Peasant Studies* 13, 1986). The recent focus is on

> . . . a vast and relatively unexplored middle-ground of peasant politics between passivity and open, collective, defiance . . . Under this concept may plausibly be grouped the ordinary weapons of many subordinate groups – ranging all the way from clandestine arson and sabotage, to foot dragging, dissimulation, false compliance, pilfering, slander, flight, and so forth. Although varied, such forms of resistance have certain features in common. They require little or no co-ordination or planning . . . [and] typically avoid any direct symbolic affront to authority . . . Resistance of this kind does not throw up any manifestos, demonstrations and pitched battles that normally compel attention, but vital territory is being won and lost here, too.'[3]

In particular, we have in mind the notion of 'avoidance protest' [Adas (1986)] which is a form of everyday resistance that involves *some cost* to the resistor. It is a form of *social* protest, though it may be carried out on an individual, uncoordinated basis. Here, we model resistance that takes the form of a *refusal to work for a particular employer*. Of course, if such a refusal is *too* costly to the potential protester, no such protest will be forthcoming, and this motivates the second major postulate of our analysis: seasonality in agricultural production. We shall argue that it is the seasonal nature of

[1] Indeed, if the subsistence notion is defined broadly enough, it is very difficult to falsify such an assertion. See Dasgupta and Ray (1991) for a discussion of this and related issues.

[2] See Drèze and Mukherjee (1989) for a detailed evaluation.

[3] Kerkvliet and Scott (1986).

agriculture that permits, at one stroke, the existence of widespread involuntary unemployment in the slack, together with credible voicing of protest in the peak.

We must emphasize, at the outset, that *no* collusive or monopolistic elements are present in our model. Our objective is to keep faithfully to an idealization of a casual labour market, while generating outcomes which are not 'perfectly competitive' in the usual sense of the term.

Briefly, we consider two crop seasons: slack and peak. Labour demand is low in the slack, high (and uncertain) in the peak. There is a large number of farmers (employers) and labourers. In the slack season, a labourer has no option but to accept any wage offer not less than his reservation wage. However, depending on the state of affairs in the peak season, a labourer may decide to refuse to work for the farmers that have been unfair in his opinion, in the sense of paying a 'low' wage. (See section 3.2.) The farmers are aware of these possibilities and act accordingly. Our objective is to describe the set of equilibrium slack wages that result.

Our analysis has the following broad features:

1. In general, the model predicts a *set* of possible equilibrium wage configurations. This set can be fully characterized. All but one wage configuration in this set involve wage payments that exceed the reservation wage, despite the presence of slack season involuntary unemployment.
2. An increased seasonality in agriculture (defined in a variety of ways) sharpens this phenomenon by expanding the set of equilibrium wage configurations.
3. For each equilibrium, a particular pattern of wage payments is predicted across farmers with different land holdings. This pattern is fully pinned down by the model once we know how the ratio of slack to peak labour demand varies with land size, which is an empirical question.
4. The model predicts sticky money wages, but relatively flexible *real* wages (within some limits). That is, despite the absence of any money illusion, certain changes in the real wage can be created by changes in the price level, while at the same time these changes cannot be effected with a constant price level.
5. The model suggests that output-based contracts, the income components of which are difficult to accurately estimate, will yield lower income relative to daily wages contracts. An example of such a contract is a piece rate contract.

Some of these implications are present in the detailed village study of Palanpur. We present these and related material in section 2, to provide a concrete setting for our theoretical model. The model is described in detail in section 3, and two special cases explored in section 4. In section 5, we discuss how the set of equilibrium wages varies with the parameters of the system, and also a few possible extensions of the basic model. Section 6 concludes the paper.

2. Observations

In this section, we describe an Indian village economy that exhibits a number of features commonly observed in Indian casual labour markets. This description will serve as a setting for our theoretical model, and as a partial test for some implications of the theory.

2.1. *The village and the data set*

We use the intensive survey of the village Palanpur[4] situated in the Moradabad district of western Uttar Pradesh. The survey spanned a year including two crop seasons – *rabi* of 1983–84 and *kharif* of 1984.

In our field of interest, rural wages, the available data base is a census of all labour contracts in which any villager was a partner in the survey year. Concentrating on the intra-village contracts we observed that casual labour was the only form of labour contract (except, of course, sharecropping) and the village labour market was practically closed to outsiders.

In this market, there was a common system for labour recruitment called '*bulaana*', or literally, 'calling'. The farmer had to go to the labourer's house to recruit him.[5] Our model of offer refusal fits perfectly into this system. A refusal to work for a particular person is certainly *one* feasible response in this '*bulaana*' framework. Furthermore, such a refusal imposes a natural additional search cost on the employer, particularly in the peak harvesting season where time is of the essence.[6]

2.2. *Seasonal involuntary unemployment in Palanpur*

A close examination of the data revealed that wheat sowing, wheat harvesting, and the period immediately following the harvest were relatively busy periods for casual labourers. Defining *average employment* in a period as the average number of persons employed per day in the period, we observed that the wheat harvesting period was by far the busiest time of the

[4]The survey had been conducted by J.P. Drèze. Refer to Bliss and Stern (1981) for more information on Palanpur.

[5]This system is not unique of Palanpur. For references see Drèze and Mukherjee (1989).

[6]The reader may ask for evidence showing refusals do take place. Unfortunately, the surveyors recorded only those employment contracts that finally materialized. However, they noted that farmers often had difficulties in finding labourers in the peak season.

Table 1

Average employment and total employment per day in village Palanpur.[a,b]

Season	Type of labourers	Total employment	Average employment
Slack	Adult males	2,088	6.14
Slack	All	2,236	6.58
Peak	Adult males	501	25.00
Peak	All	642	32.10

[a]In all 32 villagers reported casual agricultural labour as their primary activity, but we suspect the number of regular agricultural labourers is even less.

[b]The total employment for peak season might have been under-reported, there is a significant discrepancy between the supply side and the demand side data.

year.[7] We call it the *peak season*. The rest of the year will be known as the *slack season*.

Within the slack season itself there was considerable fluctuation of employment per day. The average employment during the wheat sowing month or the post harvest month was approximately 1.8 times the average employment for the whole slack season. In contrast with this, the daily wage showed little change during the slack season.[8] That the extra employment was not accompanied by a fluctuation in the slack wage indicates there might have been involuntary unemployment in the village during at least the major part of the slack season. See table 1 for details.

Calculations of proportion of days in employment (that is, employment in wage labour) for individual labourers yielded much lower figures for slack season than for peak season. See table 2.

The labourers' responses to the following questions are most significant. They were asked: (1) 'for how many days in a year do you get work?' and (2) 'for how many days in a year would you like to work?' Most of the replies to the former question were 'we are more or less sure of being employed in the wheat sowing season and the wheat harvesting season. Otherwise it is a few days sprinkled here and there.' (In Hindi they said '*mahine mein do-char din*'.) To the latter question the ready reply was 'everyday!'.

2.3. *Some evidence that slack wages exceed reservation wages*

There were two major systems of wage payment in Palanpur. One was the

[7]In the wheat harvesting season the average daily employment recorded was 4.88 times that of the average employment for the slack season.

[8]The nominal wage remained unchanged, and the price changes were small enough for us to ignore it.

Table 2

Table of tentative probabilities of employment for agricultural labourers in Palanpur.[a,b]

Labourer (adult male)	Probability of employment (percent of days)	
	Slack	Peak[c]
1	40.1	75.0
2	28.1	n.a.
3	35.2	n.a.
4	30.5	Away from Palanpur
5	19.5	55.0
6	24.1	55.0
7	13.3	85.0
8	5.9	50.0
9	29.1	100.0
10	18.4	50.0
11	27.1	75.0
12	20.6	75.0
13	15.7	87.5
14	8.2	100.0
15	13.6	Away from Palanpur
16	32.3	82.5
17	36.2	60.0
18	32.1	60.0
19	48.3	87.5
20	18.6	35.0

[a]The proportion of days for which the labourer was employed has been called the probability of employment here.

[b]We have considered those individuals who were engaged in casual agricultural labour for an appreciable length of time in the slack season. A few of the people listed here have alternative employment, mostly cultivation.

[c]n.a. stands for not available.

familar *daily wage* system, which involved a standard amount of effort, a standard number of hours,[9] as well as a standard wage. In the slack season the majority of contracts were daily wage contracts.[10]

There was also a system of paying an amount for completing a specified unit of work, which will be henceforth referred to as the *piece rate* system. Some examples of such contracts are weeding one bigha[11] of land for Rs. 5, or harvesting wheat for 1/20th share, etc. There is an intrinsic element of ambiguity about the actual effort involved in the case of piece rate contracts and about the difficulty of the task. Perhaps for this reason, there were no

[9]Most daily wage work in Palanpur was supervised.

[10]Approximately 7/9th of the field work in slack season was done under daily wage system.

[11]6.4 bighas = 1 acre in Palanpur.

standard rates per unit for piece rate work, particularly in the slack season. Piece rates for weeding, for instance, varied from Rs. 4 per bigha to Rs. 6 per bigha.

We shall argue that, in the slack season, piece rate wages for field work are often significantly lower than daily wages, which indicates that not all labourers have reservation wages equal to the slack daily wage.

It is possible to argue that this kind of test is inappropriate. After all, a piece rate contract permits a greater consumption of leisure by the worker, for he can work at his own pace. Therefore, a lower piece rate wage might only serve as compensation for this, with total worker utilities equalized under both contracts. We feel, however, that in a situation of *widespread* unemployment such as the one considered here, a significant gap between the two types of wages cannot simply be explained by higher leisure consumption under one of the contracts. With unemployment, the marginal utility of leisure is close to zero. If there is a significant additional income to be gained, an unemployed person will sacrifice his abundant leisure time to do so.

To compare piece rate incomes with daily wages, it was necessary to find some daily wage equivalents for piece rate payments. In an attempt to correct for inter-contract variations in effort per day,[12] average speed (e.g. average number of bighas weeded per day) was calculated separately for each type of task (such as weeding, digging, harvesting, etc.) and the rates for each contract multiplied by the relevant average. The figures thus obtained were used for comparison with daily wages. They will be referred to as *piece rate wages*.

First it was tested statistically using the run test whether the piece rate wages and the daily wages could have come from the same distribution. The test was carried out separately for both slack and peak seasons. All the results were negative. A test for comparing the means of the two distributions revealed that in the slack season, average piece rate wage for field work was *significantly below* average daily wage. In fact 87% of the piece rate wages were below the average daily wage. See tables 3.a and 3.b for the detailed results of tests.

It may be argued that a labourer may work for poor wages if his labour has been 'tied' by some means, be it through an interlinked contract with some other factor market, or a case of labour-tying through a guarantee of steady employment (an implicit contract). Durations of contracts were short in Palanpur, and instances of common partnerships in labour and tenancy markets, or labour and credit markets were also few. So, this possibility may be ruled out.

[12]Days recorded were standardized by the surveyors to number of full working days.

Table 3.a

Results of run tests.[a,b]

Sample 1	Sample 2	Test statistic	Result	Level of significance
Daily wages, slack	Piece rates, slack	−44.6	Rejected	1%
Daily wages, peak	Piece rates, peak	−21.3	Rejected	1%
All daily wages	All piece rates	−50.4	Rejected	1%

[a]The null hypothesis is that both the samples come from the same distribution. It is rejected if the value of the test statistic is too high.

[b]Nominal wages have been used for tables 3.a, 3.b and 4. The price fluctuations in the slack season were small enough to be ignored. The lower prices in the peak season will only heighten the contrast between peak and slack wages.

Table 3.b

Results of significance tests for equality of means.[a,b,c]

Sample 1	Sample 2	Null hypothesis	Alternate hypothesis	Result
Daily wages, slack	Piece rates, slack	$\mu_1=\mu_2$	$\mu_1>\mu_2$	Rejected
Piece rates, peak	Piece rates, slack	$\mu_1=\mu_2$	$\mu_1\neq\mu_2$	Rejected

[a]The distribution means corresponding to sample 1 and sample 2 are denoted by μ_1 and μ_2, respectively.

[b]Wages for only field work have been included, because non-field work usually involves some skill.

[c]The level of significance in each case was 1%.

The average piece rate wage could be lower than average daily wage if (1) labourers in general work at a slower speed when they are paid according to piece rates, or (2) in general the terms of the piece rate contracts are worse for labourers.

We shall argue that the latter is the case.

A discussion with farmers in Palanpur revealed that most farmers felt labourers hurry too much while working on piece rate contracts and quality, *not speed*, is likely to suffer. Indeed, many farmers said they opted for labour hire on piece rate when they needed a large amount of work to be completed in a short time.[13]

Recall our earlier discussion in this section regarding income differentials as compensation for higher leisure. The reader can consult table 4 for the differences in average wages. The *rabi* slack saw the piece rate wages fall to even less than Rs. 4 per day on occasions as against a daily wage of Rs. 7. It

[13]The interested reader may see Reddy (1985) for a discussion on the allocation of contracts between several types such as daily rates, share rates etc.

Table 4
Average wages according to season and contract type in village Palanpur.[a]

Season	Contract type	Average wage (in Rs.)
Slack	Piece rate, field work	5.85
Slack	Daily wage, field work	7.70
Peak	Piece rate	9.16
Peak	Daily wage	8.95

[a]In peak season, almost all contracts involve field work.

is difficult to imagine that differentials of this magnitude reflect a preference for leisure in a situation of unemployment.

These observations indicate that *the going slack wage in Palanpur was above the reservation wages for many casual labours.*

Quite apart from this implication, it is of some independent interest that piece rate contracts may yield substantially lower incomes. The model we construct might throw some light on this finding.

3. A theoretical model

3.1. Overview

In this section we introduce a model of a village economy in which labourers may get wages higher than their reservation wages in the agricultural slack season in spite of the existence of involuntary unemployment. As we shall see, the *seasonal* nature of agricultural production will be crucial to the argument.

Consider a village economy where agriculture is the only activity. Crop production takes place in two stages: sowing, weeding, etc. in the *slack season* and harvesting in the *peak season.* The level of activity during the slack is indicative of, but does not fully determine the extent of labour requirements in the peak. Here *Nature* plays a crucial role, and a random parameter θ captures the effect of uncertainty on peak labour demand (see section 3.3 for details). The *distribution* of θ is commonly known, but its *value* is realized only in the peak season. Let the cumulative distribution function of θ be denoted by $\Pi(\theta)$, and the density function of θ be $\pi(\theta)$.

No labourer or farmer in the village has the power to affect the total labour demand or supply by their individual actions. Formally, in the model, both labourers and farmers are supposed to be uncountably infinite in number so that their contribution to the labour demand or supply is *infinitesimal* as compared to the aggregate.

The farmer in the model is free to choose the slack season wage he pays, but the peak season wage is fixed at $w_0 > 0$ by assumption. The labourers remember the terms of each wage payment by each farmer. All wages, costs and utilities are measured in units of the same homogeneous crop.

The farmers must go to labourers with job offers for recruitment. We shall presume there is widespread unemployment in the slack season, so that every labourer accepts a job offer as long as the wage is not less than his reservation wage. However, in the peak season, the labour market is tighter and, *provided that a refusal is not too costly*, a labourer may refuse to accept a job offer from a farmer who, in his opinion, has been 'unfair' in the slack season. (See section 3.2 for a further elaboration.) It is the possibility of these potentially costly refusals that guides an employer's choice of wage levels in the slack season.

3.2. *The labourers*

Each labourer supplies one unit of slack season labour inelastically, provided the wage is not less than his reservation wage, which we normalize to zero.[14] The total labour supply in the peak season is denoted by L.

A labourer's total utility is assumed to be a function of

(1) his wage earnings, and
(2) certain beliefs, and actions taken on the basis of these beliefs.

We shall now elaborate on the latter set of factors.

A labourer believes that a farmer is '*unfair*' if he pays a wage lower than the labourer's '*notional fair wage*' in the slack season to *any* labourer. The labourer would like to refuse offers of employment from these unfair farmers in the following peak season and this action would bring him additional utility.

Of course, there are costs involved in making these refusals. In general, the labourer's decision to refuse or accept peak season offers will depend on the following two factors: (1) the tightness of the labour market in the peak season, and (2) the percentage of labour demand coming from farmers who, in *his* view, have been fair.

Let us be more specific. We index each labourer by a number $m \in [0, 1]$ (call him labourer m). Labourer m is characterized by his *notional fair wage* w_m. Denote by $Z(w_m)$ the cumulative distribution of the notional fair wage across labourers. In all other respects the labourers are identical. In general the notion of a fair wage is allowed to vary across individuals.[15] Certainly,

[14]We assume all labourers have the same reservation wage, so that all wages are being expressed as deviations from the common reservation wage.

[15]See Kerkvliet (1986) for similar variance among Philippino villagers in the concept of 'injustice'.

the case where all labourers have the *same* fair wage can be allowed as a special case.

We capture the refusal decision of the labourer (in the peak) as follows: there is a function $R(P, n_m)$, common to all labourers, which gives the probability that the labourer will refuse an *unfair* farmer, as a function of the *employment rate* in the peak (P), and the percentage of labour demand coming from the fair farmers (n_m). Therefore, the probability, p_m, that labourer m will refuse an offer from an unfair farmer in the peak is given by

$$p_m = R(P, n_m), \tag{3.1}$$

where n_m denotes the fraction of peak season demand from farmers who paid a wage of at least w_m in the slack season.

We make the following assumptions on R:

(*R.1*) R is a continuous function, increasing in P whenever $n_m > 0$.

(*R.2*) $R(P, n_m)$ is nondecreasing in n_m.

(*R.3*) $R(P, 0) = 0$ for all $P \in [0, 1]$.

Assumption (R.1) implies that if the probability of peak season employment increases, then so does the probability that the labourer will refuse an unfair farmer. Assumption (R.2) says that the labourer finds it easier to refuse an unfair farmer, if the strength of fair farmers is higher. The last assumption says that if *all* farmers are unfair in the eyes of the labourer, he does not find it worthwhile to engage in protest, for the costs are simply too high. In life, people who have high standards often fail to meet them, and this need not be an exception. We hasten to add that (R.3) simplifies the analysis, but is not really required in the sense that the main ideas of the paper are completely robust to the relaxation of (R.3).

While our behavioural postulates may seem somewhat arbitrary, we believe there are strong grounds for recommending its use:

1. It is a natural way of capturing a form of avoidance protest discussed in the introduction. We are postulating that each labourer *does* have some social norms, and will indeed choose his actions to uphold such norms, provided that such actions are not too costly. In the specific context of our model, the seasonality postulate is crucial. A refusal to work, so costly in the slack season, may not be such a daunting prospect in the peak. It is well known that such social beliefs, and obedience to such beliefs can have strategic value [see, e.g. Frank (1987)]. For economic models in the same spirit, see, e.g. Akerlof (1980) and Kuran (1987).
2. While the above justification is sufficient (to our minds), one might also

regard our postulate as a convenient shorthand for modelling a repeated relationship. Even if labourers do not receive any direct utility from refusing peak season offers, they recognize the importance of such refusals in maintaining the level of the slack season wages. While such a repeated game formulation is attractive,[16] we eschew it here to focus more directly on the characteristics of the short-period equilibrium. One simple way of doing this is to 'truncate' the dynamic model by postulating the existence of a 'credible refusal' by the labourer provided, of course, that such a refusal is not overwhelmingly costly to him.[17] This is precisely what we do here.

3.3. The farmers

A farmer is characterized in this model by a number $k \in [0, \infty)$ which represents his level of operational land size *and* farm capital.[18] For brevity, we shall refer to k as the farmer's *landholding* or simply *land*. A farmer with land k will be referred to as farmer k. Denote by $N(k)$ the cumulative distribution of k. So the *total* amount of land in the village is

$$\int_0^\infty k\,\mathrm{d}N(k) < \infty.$$

Consider farmer k. We denote his *labour requirement in the slack season and in the peak season* by $\alpha(k)$ and $\theta\beta(k)$ respectively, where $\alpha(\cdot)$ and $\beta(\cdot)$ are positive valued functions. We assume that Nature does not affect slack season labour requirement, and affects peak season labour requirement in a multiplicative way. This is only a simplifying assumption. A somewhat less heroic simplification is the inelasticity of labour demand with respect to prices. It should be mentioned that the main results go through if the wage elasticity of labour demand is bounded above, which is a plausible assumption.

Denote by B the integral $\int_0^\infty \beta(k)\,\mathrm{d}N(k)$.[19] Then if the support of θ is given by $[\underline{\theta}, \bar{\theta}]$, $\bar{\theta}B$ denotes the maximum conceivable demand for labour. We will assume (to avoid complications[20]) that even this magnitude is less than or equal to the available labour supply L, so that

[16]For a study of the role of punishments in supporting non-myopic equilibrium outcomes in repeated games, see e.g. Green and Porter (1984) and Abreu (1988).

[17]Similar truncations have been exploited, for example, in the literature on international debt repayments. See for example, Eaton and Gersowitz (1980).

[18]By farm capital we mean the implements, machinery, money and labour that the farmer has at his disposal, without hiring or borrowing.

[19]Assume that $\beta(k)$ is a bounded-valued function so that this integral is finite.

[20]The only complications relate to modelling of the peak season labour allocations when there is full employment. A model with peak season wage flexibility can easily accommodate this feature.

$$\theta B \leqq L \quad \text{for} \quad \text{all } \theta \in [\underline{\theta}, \bar{\theta}]. \tag{3.2}$$

In the peak season, the *farmer* carriers out the search for labour. There are costs to be incurred if he is faced with refusals. In general, these costs are a function of the number of refusals (r) and the farmer's peak season demand for labour (l): call this function $h(r, l)$.

This cost function may assume a variety of forms, depending on the kind of cost that it is be emphasized. Suppose, for instance, that the farmer loses an amount $c>0$ each time there is a refusal. This 'search cost' may be viewed as arising from delaying an operation in which *time* is of the essence. In this context, see, for instance, Binswanger et al. (1984) which says '. . . The large yield or quality reductions caused by delays in agricultural operations such as sowing, weeding, and harvesting appear to result in competitive pressures on the labour demand side that makes collusion [to fix wages] unsuccessful'.

In that case, we may take

$$h(r, l) = cr \quad \text{for} \quad \text{all } l > 0.$$

Of equal importance in this context is the *loss of output* involved if the number of refusals reach a certain threshold fraction of the farmer's peak season labour demand. Let this fraction be λ. In its simplest form, this type of cost is captured by the function:

$$\begin{aligned} h(r, l) &= Hr \quad \text{if} \quad r \geqq \lambda l \\ &= 0 \quad \text{otherwise,} \end{aligned}$$

where Hr is the output loss, taken to be proportional to the number of refusals.

It is convenient and natural to assume that h satisfies a 'constant-returns-to-scale' assumption: that is, $h(\alpha r, \alpha l) = \alpha h(r, l)$ for all $\alpha > 0$. This assumption is satisfied in both the examples above. We also impose the obvious restrictions that $h(0, l) = 0$ and $h(r, l)$ is nondecreasing in r.

Every farmer is aware that the probability of refusal in the peak season is a function of the state of Nature, and the slack season wage paid by himself and others. Assume that no farmer can identify any labourer as being of any particular type, and must therefore assign the same probability of refusal to every labourer that he offers a peak season job to. In the sequel, this probability function will be taken to be the same as the one that is *actually* generated by the behaviour of labourers (section 3.2). For now, assume that each farmer takes the following function as given:

$$p = p(w, \theta, \mathbf{w}). \tag{3.3}$$

The value p is the probability that a *peak* season employment offer made by a farmer will be refused by a labourer, *given* that farmer's *slack* season wage offer w, the state of Nature θ, and the entire wage schedule $\mathbf{w}$ in the slack season.

With our assumption of a continuum of farmers, it is immaterial whether we consider the *entire* wage schedule $\mathbf{w}$, or the schedule of wages paid by all *other* farmers. In other words, an individual farmer cannot affect, by his actions, the probability of refusals faced by other farmers.

Assume that each farmer is risk-neutral. Then, noting that the number of refusals, with probability one, is given by pL if L is the peak season labour requirement,[21] we obtain that farmer k solves the following minimization problem:

$$\min_{\{w: w \geqq 0\}} \mathrm{E}[\alpha(k)w + \theta\beta(k)w_0 + h(p\theta\beta(k), \theta\beta(k))]. \tag{3.4}$$

Using the constant returns assumption on h and removing additive terms that do not influence the farmer's wage decision, this problem is easily seen to be equivalent to

$$\min_{\{w: w \geqq 0\}} \mathrm{E}[\rho(k)w + \theta c(p(w, \theta, \mathbf{w}))], \tag{3.5}$$

where $\rho(k) \equiv \alpha(k)/\beta(k)$, and $c(p) \equiv h(p, 1)$.

Let us name this modified cost function of the farmer $C(w, k, \mathbf{w})$.

We should emphasize that the conceptual premise embedded in this cost function is that the employer faces potential acceptance or rejection from broad sections of the society, and the identity of the particular workers he is employing is of little consequence in this regard.

3.4. *Equilibrium*

We are now in a position to define an equilibrium for the village economy. First, suppose that a wage schedule $\mathbf{w} = (w(k))$ is given, and consider a particular value of θ. For labourer m, with fair wage w_m, define

$$n(w_m, \mathbf{w}) \equiv \frac{\int_{\{k: w(k) \geqq w_m\}} \beta(k)\, \mathrm{d}N(k)}{B}. \tag{3.6}$$

[21] This simplification, that pL is the number of refusals with probability one, and not the *expected* number, arises from the supposition that each labourer supplies an infinitesimal amount of labour (relative to labour demand). In the linear examples that we consider in detail in the following sections, this makes no difference.

This is equal to n_m, the proportion of the peak season labour requirement arising from farmers who are fair in the eyes of labourer m, under the wage schedule $\mathbf{w}$.

Next, we observe that the state-dependent employment rate P_θ, is simply

$$P_\theta = \theta B/L. \tag{3.7}$$

Recalling (3.1) and using (3.6) and (3.7), we may characterize labourer m's probability of refusal as

$$p_m = R(\theta B/L, n(w_m, \mathbf{w})). \tag{3.8}$$

We can quickly use (3.8) to obtain an *aggregate* 'probability of refusal' function, with domain $(w, \theta, \mathbf{w})$. This is

$$p^*(w, \theta, \mathbf{w}) = \int_{w_m > w} R\left(\frac{\theta B}{L}, n(w_m, \mathbf{w})\right) \mathrm{d}Z(w_m). \tag{3.9}$$

The function $p^*(w, \theta, \mathbf{w})$ gives us the overall probability that a farmer who offered w in the slack (when the overall schedule was $\mathbf{w}$) will be refused by a labourer in the peak. Observe that, ceteris paribus, $p^*(w, \theta, \mathbf{w})$ is nondecreasing in w.

Now we define an *equilibrium*. This is a wage schedule $\mathbf{w}$ such that for every farmer k,

(1) $w(k)$ solves the problem (3.5), with
(2) $p(w, \theta, \mathbf{w}) = p^*(w, \theta, \mathbf{w})$.

We should point out that condition 2 of an equilibrium does *not* necessarily mean that each farmer knows the notional fair wage of each labourer, or even the distribution function $Z(\cdot)$. Of course, the model is perfectly compatible with either of these two informational scenarios But the model is equally compatible with an informational situation where the farmers *only* anticipate a particular probability (of refusal) function. This is equal to the true one as an equilibrium condition, but the 'convergence' of the two to each other is left unmodelled here.

Our equilibrium notion takes as exogenous the 'fair wage beliefs' of labourers. This is a drawback of the model. A more complete picture would endogenize this, requiring that the distribution of the fair wages must correspond, in some sense, to the set of possible *equilibrium* wages that can arise out of that distribution. We do not pursue this extension here.[22]

[22]For a model where the notional fair wage is determined endogenously on the basis of the agents' utilities, see Akerlof (1980).

The reader will easily verify the truth of the following, using (R.3):

Observation. The wage schedule given by $w(k)=0$ (that is, wage equal to the reservation wage) for all k is always an equilibrium.

The reason is simple. In this situation, using (R.3), the labourers for whom zero is less than their notional fair wage will not be able to refuse any farmer, because for them *all* farmers are unfair. Of course, the labourers who feel that zero is a fair wage will not want to refuse any farmer.[23]

Thus, there is always scope for the whole system to 'break down' to what one might call the *trivial equilibrium.* Our main interest is in characterizing *nontrivial* equilibria in which $w(k)>0$ for at least a positive measure of farmers. This is the task of the next section. However, before we move on, we state a result which may be derived from this general framework.

Proposition 1. In any equilibrium, if for some k_1, k_2, we have

$$\rho(k_1)=\frac{\alpha(k_1)}{\beta(k_1)}>\frac{\alpha(k_2)}{\beta(k_2)}=\rho(k_2),$$

then

$$w(k_1)\leqq w(k_2).$$

Proof. Recall that equilibrium wages always minimize $C(w,k,\mathbf{w})$. Since $w(k_1)$ and $w(k_2)$ are both equilibrium wages, it follows that for the individual farmer with land k_1, who finds it optimal to pay $w(k_1)$,

$$\rho(k_1 w(k_1)+\mathrm{E}[\theta c(p(w(k_1),\theta,\mathbf{w}))]\leqq\rho(k_1)w(k_2)+\mathrm{E}[\theta c(p(w(k_2),\theta,\mathbf{w}))] \quad (3.10)$$

and for the individual farmer with land k_2 who finds it optimal to pay $w(k_2)$,

$$\rho(k_2 w(k_1)+\mathrm{E}[\theta c(p(w(k_1),\theta,\mathbf{w}))]\geqq\rho(k_2)w(k_2)+\mathrm{E}[\theta c(p(w(k_2),\theta,\mathbf{w}))]. \quad (3.11)$$

Subtracting (3.10) from (3.11) we get

$$w(k_1)(\rho(k_1)-\rho(k_2))\leqq w(k_2)(\rho(k_1)-\rho(k_2))$$

or,

$$w(k_1)\leqq w(k_2).$$

[23]This Observation may not hold if (R.3) is dropped. But our main interest is not in the existence of a reservation wage equilibrium, but in equilibria involving higher wages.

This is an intuitive result. For those farmers whose slack season labour requirements are relatively larger, a given probability of refusal function is somewhat easier to tolerate. This is because their peak season labour demands are (relatively) low, and to this extent there is a greater incentive to save on slack season costs.

A plot of Palanpur data on operational land holding versus ratio of slack and peak season labour hire, shows an inverse-U shaped pattern, leaving aside the group of farmers owning less than one acre of land. One may interpret it like this. The small farms need very little hired labour, and especially in the slack season, most of their labour requirements are met from within the family. The middle farms have somewhat less pressure on land (from within the family) both because of larger land size and social taboos.[24] They are usually not rich enough to purchase machinery replacing labour on a large scale (such as tractors) and do not always have enough work for a full-time farm servant. The large farmers are very likely to have farm servants or modern machinery to take care of a substantial part of their slack season labour requirements. This brings about the difference in slack season labour requirements.

In the peak season there is not such a vast difference in labour requirement per area. There is wide evidence that even small farmers need hired labour in the peak season. Further, the effect of the technology is diffused more evenly over all landowning groups.[25]

Suppose that we accept this empirical description. Then Proposition 1 yields the following testable description: the large farmers and the small farmers will *never* pay lower wages than the middle farmers. Of course, it should be noted that all the inequalities of Proposition 1 are 'weak', and in no way are incompatible with a uniform wage schedule across farmers. Indeed, a *uniform*, nontrivial, wage equilibrium can always be shown to exist in our model, *whenever* there exists a nontrivial equilibrium with wages bounded away from the reservation wage. A direct examination of the wage data in the case of Palanpur and many other villages[26] appears to support this uniformity.

In the absence of mechanization, large farmers would have higher $\rho(k)$ than small farmers. That big farmers sometimes pay lower wages than small farmers is usually explained in terms of extra-economic power. Proposition 1 gives a possible economic reason for such a phenomenon. We cannot resist quoting a very pertinent piece:

[24]Some such taboos are that women must not work on farms, *brahmins* must not touch the plough, etc.

[25]Peak season labour may be replaced mostly by mechanical threshers or harvesters. In Palanpur the services of a thresher are hired out more freely than that of a tractor or a pumpset and there are no mechanical harvesters.

[26]See Drèze and Mukherjee (1989) and Bardhan and Rudra (1980) for some evidence.

> In the peak season the labourers has a better bargaining power . . . The 'larger' group of farmers had a complaint that 'small' group farmers, because of the small size of their lands, did not mind paying higher wages for one or two days and thereby inflated the labour market[27] . . .

4. A full characterization of equilibria in some specific cases

Our goal in this section is to fully describe the set of *uniform* equilibrium wage schedules in two simplified versions of the model. By this we mean equilibrium wage schedules where two farmers of the same type pay the same wage in equilibrium. While we have not been able to eliminate the possibility of 'non-uniform' equilibria, these would appear to be of technical interest at best. There is overwhelmingly strong evidence, as mentioned above, for wage uniformity in the literature on village labour markets, at least among similar employers.

In the first case (section 4.1), we shall assume that all the farmers have the same land holding k. In the second case (section 4.2), we will consider farmers with two different land sizes. The analysis reported in section 4.2 also goes through any finite number of different land holdings. In this section, we make some additional assumptions on Z, the cumulative distribution function of the labourers' characteristics. We also postulate a specific type of refusal function $R(\cdot)$ in section 4.2. In both the cases, we obtain a complete picture of the uniform equilibrium set.

We also show, in section 5, that this set is particularly amenable to 'comparative statics' analysis with respect to the parameters of the model.

4.1. Identical farmers

We assume that every farmer in the village holds an identical amount of land, k. By a uniform wage equilibrium we will now equivalently mean an *equilibrium wage* w^*. Our purpose is to describe the set of w^*s that can be achieved as an equilibirum.

Define, for each θ,

$$\bar{R}(\theta) \equiv R(\theta B/L, 1). \tag{4.1}$$

We will first state our main result, then develop its proof in the discussion to follow.

Proposition 2. The set of possible equilibrium wages is precisely the set of all $w^* \geqq 0$ *such that*

[27]See Kandasamy (1964).

$$\min_{w\in[0,w^*]} \rho(k)w+\int_{\underline{\theta}}^{\bar{\theta}}\theta c(\bar{R}(\theta)\{Z(w^*)-Z(w)\})\,\mathrm{d}\Pi(\theta)=\rho(k)w^*. \tag{4.2}$$

The argument underlying Proposition 2 is very intuitive. Suppose all farmers are paying the same wage w^*. This will be an equilibrium wage if for each farmer, w^* is an optimal wage when rest of the farmers in the village are paying w^*. To write it formally, we change our notation a little: $p(w,\theta,w)$ may now be rewritten as $p(w,\theta,w^*)$ and $C(w,k,w)$ may be rewritten as $C(w,k,w^*)$. (The sense is quite obvious.) The condition for w^* to be an equilibrium wage is

$$w^*=\arg\min_{\{w:w\geq 0\}} C(w,k,w^*). \tag{4.3}$$

Let us first derive the exact form of the function $p(w,\theta,w^*)$. The proportion of labourers refusing a farmer who has paid any $w\in[0,\infty]$, given some θ, is equal to the proportion of labourers for whom

(1) w is notionally unfair, and
(2) who can punish the offending farmer given that all others pay the same wage, w^*.

Note that labourers may be divided into two groups – those who consider w^* to be unfair, and those who consider w^* to be a fair wage. Their relative strengths in the population are $(1-Z(w^*))$ and $Z(w^*)$, respectively. For each labourer in the former group, *all farmers are unfair*, and so, using (R.3) we infer that they cannot punish any farmer. For the labourers in the latter group, *practically all farmers are fair* because one farmer's labour requirement is negligible compared to the whole [so that $n(w^*,w)=1$]. Thus using (4.1) and (3.9) we have

$$\begin{aligned} p(w,\theta,w^*) &= \bar{R}(\theta)(Z(w^*)-Z(w)) \quad \text{if} \quad w\leqq w^* \\ &= 0 \qquad\qquad\qquad\qquad\quad \text{otherwise.} \end{aligned} \tag{4.4}$$

Note that no farmer will wish to deviate individually to a wage above w^*, because in that case he will only be increasing slack season wage cost without lowering the peak season refusal probability. The equilibrium condition may then be rewritten using (3.5), (4.3) and (4.4) as

$$w^*=\arg\min_{w\in[0,w^*]} \rho(k)w+\int_{\underline{\theta}}^{\bar{\theta}}\theta c(\bar{R}(\theta)\{Z(w^*)-Z(w)\})\,\mathrm{d}\Pi(\theta). \tag{4.5}$$

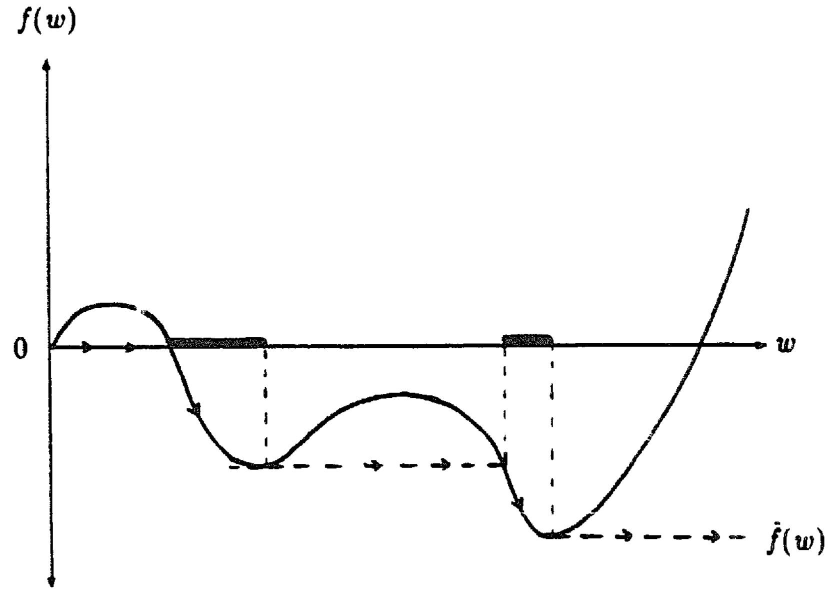

Fig. 1. The set of equilibrium wages when $h(r,l)=cr$ for all k. *Note:* Thick lines indicate the equilibrium set.

We are now done, for it is easy to see that condition (4.5) is equivalent to the statement of Proposition 2.

Let us specialize to the case where the farmer's cost $h(r,l)$ equals cr for some constant $c>0$. In this case, define

$$\tilde{e} \equiv \int_{\underline{\theta}}^{\bar{\theta}} \theta \bar{R}(\theta)\,\mathrm{d}\Pi(\theta). \tag{4.6}$$

One can now use Proposition 2 to easily obtain the following corollary:

Corollary 1. In the case where $h(r,l)=cr$ for some $c>0$, define

$$f(w)=\frac{\rho(k)}{c\tilde{e}}\,w-Z(w)$$

and

$$\hat{f}(w)=\min_{x\in[0,w]} f(x).$$

Then the set of possible equilibrium wages is precisely the set $\{w^*\geqq 0: f(w^*)=\hat{f}(w^*)\}$.

This corollary is easily deduced by simply substituting the specific functional form of $h(r,l)$ in Proposition 2, so we omit a detailed discussion. Fig. 1 depicts the same result diagrammatically.

This corollary can be written in the following explicit form when $Z(\cdot)$ has a continuous density function [denote the density by $\zeta(\cdot)$]. Define $\underline{w}_1 \equiv \inf\{w>0:\rho(k)w-c\tilde{e}Z(w)\leqq 0\}$,[28] and recursively,

$$\bar{w}_i \equiv \inf\{w \geqq \underline{w}_i:\rho(k)-c\tilde{e}\zeta(w)>0\}, \tag{4.7}$$

$$\underline{w}_{i+1} \equiv \inf\{w>\bar{w}_i:\rho(k)w-c\tilde{e}Z(w)\leqq \rho(k)\bar{w}_i-c\tilde{e}Z(\bar{w}_i)\}, \tag{4.8}$$

as long as the bracketed set in (4.8) is non-empty. Stop at the first index n for which this set is empty. *Then the set of uniform equilibrium wages is the set*

$$\{0\} \bigcup_{i=1}^{n} [\underline{w}_i, \bar{w}_i].$$ [29]

This alternative characterization can be easily deduced by using Corollary 1 and fig. 2, and we omit a proof.

Here, we specifically write out two equilibrium sets. In one case $\zeta(w)$ is decreasing throughout (see fig. 3) and there are always a smaller number of labourers associated with higher fair wages. It turns out that in this situation, the set of equilibrium wages is always *an interval* and all equilibria are uniform equilibria. To state the result precisely, define

$$\bar{w} \equiv \sup\{w \geqq 0:\rho(k)-c\tilde{e}\zeta(w)\leqq 0\}.$$ [30]

Then $[0,\bar{w}]$ is the set of equilibrium wages, illustrated in fig. 3.

Next, we consider perhaps the most plausible form of density function; namely the inverse U-shaped density function. In this case, the equilibrium set of wages generally *breaks up into two disjoint pieces.*

Let us rule out the case where the trivial equilibrium is the only equilibrium, that is, assume that there exists some $w>0$ such that $\rho(k)w-c\tilde{e}Z(w)\leqq 0$.

Define

[28] In case the set within brackets is empty, define $\underline{w}_1=0$.

[29] The reader may check that the number of disjoint intervals in the equilibrium set is at most equal to the number of modes of $Z(\cdot)$ plus one.

[30] When the set within the brackets is empty, define $\bar{w}=0$.

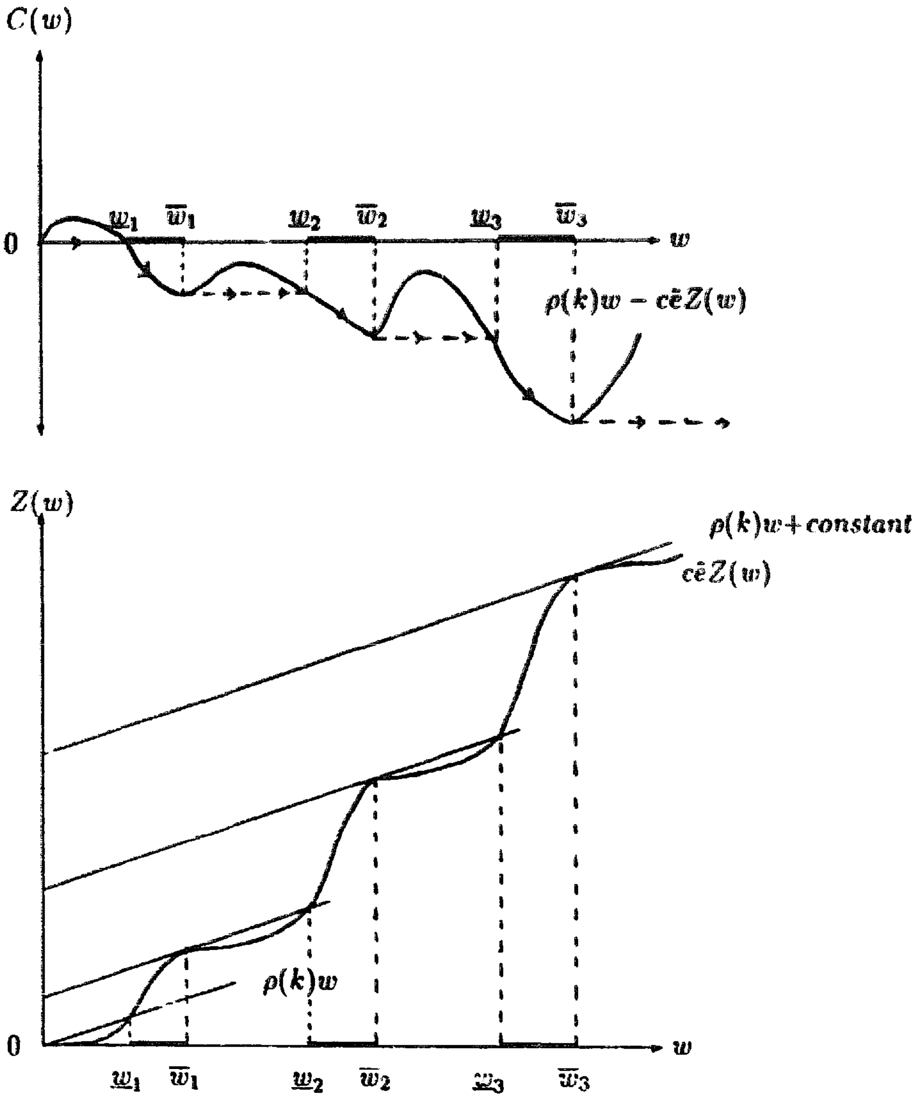

Fig. 2. Equilibrium sets when $h(r, l) = cr$: alternative description. *Note:* Thick lines indicate the equilibrium set.

$$\underline{w} \equiv \underline{w}_1 \quad \text{and} \quad \bar{w} = \bar{w}_1.$$

Then the set of equilibrium uniform equilibrium wages is $\{0\} \cup [\underline{w}, \bar{w}]$. (See fig. 4.)

The significant point in this case is that, apart from the trivial equilibrium, *the set of equilibrium wages is generally bounded away from the reservation wage.* That is, wages close to but exceeding the reservation wage are generally not supportable as equilibria. This is not counterintuitive, given that there is some bunching of the density of labourers around some central positive value of the notional fair wage.

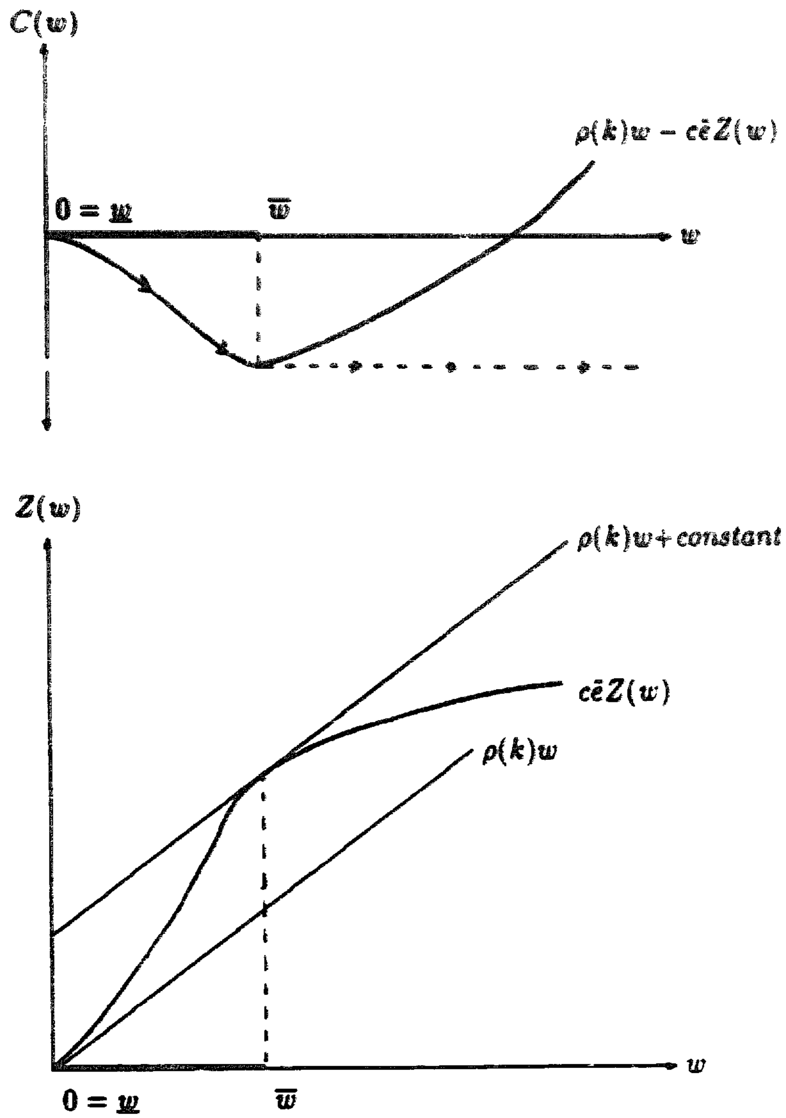

Fig 3. An equilibrium set for decreasing density of notional fair wages and $h(r,l)=cr$. *Note:* Thick lines indicate the equilibrium set.

Of course, there are exceptions to this general rule. As already stated, if $\rho(k)w > c\bar{e}Z(w)$ for all $w>0$, then the reservation wage is the only equilibrium wage. On the other hand, if $\rho(k)w < c\bar{e}Z(w)$ for all $w \in (0, \bar{w}]$, then the set of equilibrium wages reduces to the interval $[0, \bar{w}]$. (See fig. 5.)

4.2. Two types of farmers

When farmers are heterogeneous, the argument is somewhat more complicated. However, a careful analysis of the case where there are only two types will extend to a situation where there are an arbitrary (finite) number of types.

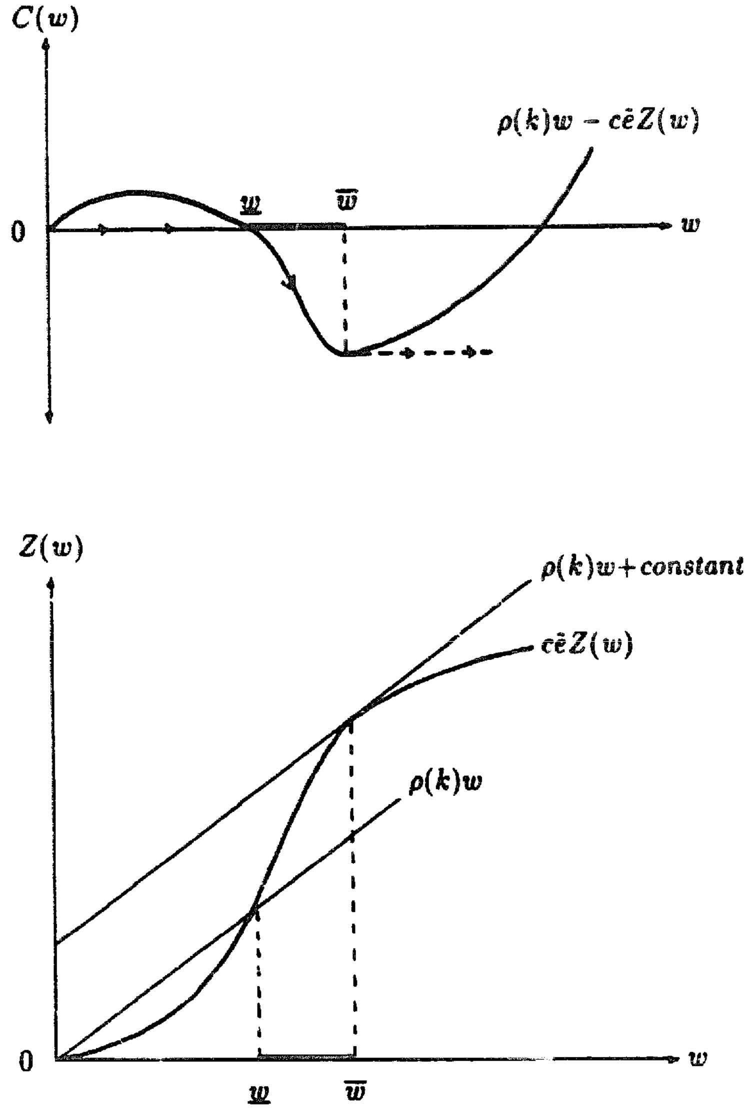

Fig. 4. A typical non-trivial equilibrium set for inverse U-shaped density of notional fair wages, and $h(r, l) = cr$. *Note:* Thick lines indicate the equilibrium set.

Accordingly, in this section, we provide a detailed description of the 'two-farmer' model. Of course, we retain the feature that *each farmer is negligible* by postulating that there are a large number of farmers of each type.

The landholdings will be denoted by k_1 and k_2, and we will assume, without loss of generality, that $\rho(k_1)<\rho(k_2)$. (The case of equality leads to exactly the same results as in section 4.1.) Denote by w^* (respectively $w^{*\prime}$) the equilibrium wages paid by farmers k_1 (respectively farmers k_2). Then we can state, given Proposition 1, that

$$w^* \geqq w^{*\prime}. \tag{4.9}$$

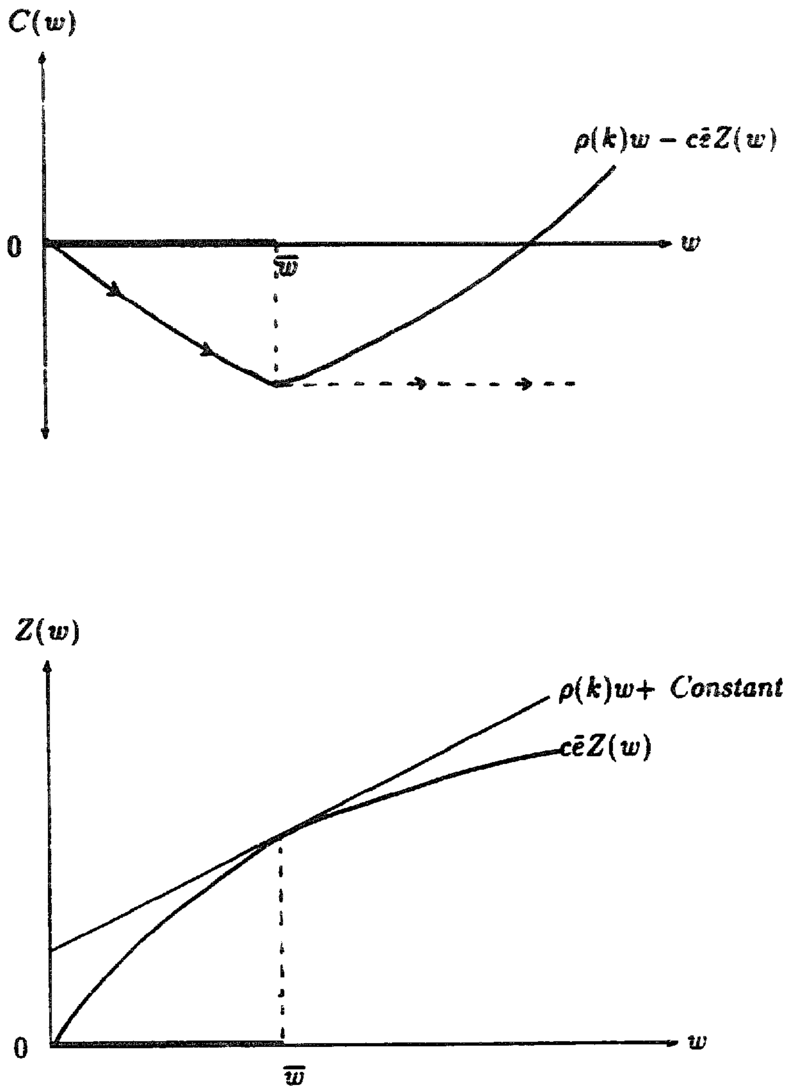

Fig. 5. The equilibrium set is an interval. *Note:* Thick lines indicate the equilibrium set.

The general case being difficult to handle, we postulate a more specific form of refusal probability of labourers. Assume that $R(\cdot)$ is separable in θ and P. Let $x(P)$ be an increasing function of P which captures the effect of technology on refusal probabilities. Let $T(n_m)$ be a decreasing function of n_m such that $T(0)>\bar{\theta}$.

We assume that for each θ,

$$R(P_\theta, n_m)=x(P)\cdot I(\theta, n_m), \tag{4.10}$$

where $I(\theta, n_m)$ is an indicator function: $I(\theta, n_m)=1$ if $\theta \geqq T(n_m)$ and is equal to zero otherwise.

This form of the refusal probability function, while easy to handle, also allows for different kinds of equilibrium wage configurations and has a very straightforward interpretation: the higher the strength of fair farmers, the easier it is for a labourer to refuse an 'unfair' farmer. In particular, if the strength of fair farmers is zero, then the labourer cannot protest at all.

We also assume that costs are linear, that is, $h(r, l) = cr$ for all l.

Let $n \in (0, 1)$ be the fraction of total peak season labour requirement coming from farmers k_1. Using the same approach as in section 4.1, define

$$\tilde{e} \equiv \int_{\underline{\theta}}^{\bar{\theta}} x\left(\frac{\theta B}{L}\right) \theta l(\theta, 1)\, \mathrm{d}\Pi(\theta), \tag{4.11}$$

and

$$\hat{e} \equiv \int_{\underline{\theta}}^{\bar{\theta}} x\left(\frac{\theta B}{L}\right) \theta l(\theta, n)\, \mathrm{d}\Pi(\theta). \tag{4.12}$$

Then $\tilde{e} > \hat{e}$.

We shall follow section 4.1 by stating the main characterization result first. The remaining discussion in this section will be used to provide some intuition for this result. Unlike section 4.1, however, we shall need an additional assumption on the distribution of notional fair wages, as the technical analysis is of a higher order of difficulty. Specifically, we assume that

> *$Z(\cdot)$ has a continuous density $\zeta(\cdot)$ with support $[0, \infty)$ which is either inverse U-shaped or decreasing throughout.*

This assumption does not appear to rule out many relevant cases.

As in section 4.1, functions of the form $\rho(k)w - ceZ(w)$ will turn out to be important. In fig. 6, we draw the 'highest' of these functions; namely, $\rho(k_2)w - c\hat{e}Z(w)$.

Purely for expositional ease, and to ensure there exist some non-trivial equilibria we shall also assume that this function displays a negative value for some part of its domain, as in fig. 6. Define, for any (k, e),

$$\begin{aligned} \underline{w}(k, e) &\equiv \inf\{w > 0 : \rho(k)w - ceZ(w) \leq 0\}, \\ \bar{w}(k, e) &\equiv \sup\{w \geqq 0 : \rho(k) - ce\zeta(w) \leqq 0\}. \end{aligned} \tag{4.13}$$

Note that these correspond exactly to $\underline{w}$ and $\bar{w}$ as defined in section 4.1.[31] Now we can state

[31] If either of the sets within parentheses is an empty set, define the corresponding value of w to be 0.

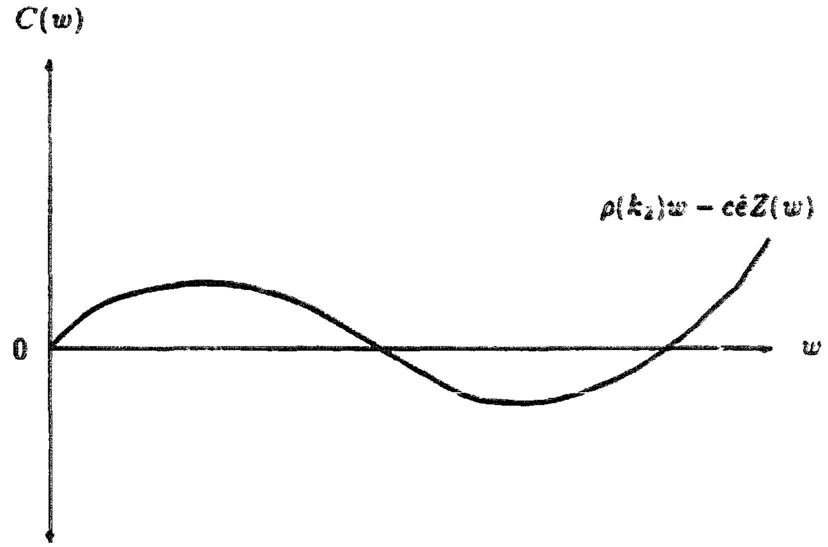

Fig. 6. The function $\rho(k_2)w - c\hat{e}Z(w)$.

Proposition 3. For a unimodal distribution of notional fair wages $Z(\cdot)$, and two types of farmers with land k_1 and k_2 and labour requirement ratios $\rho(k_1)<\rho(k_2)$, there are two possible types of equilibria: one, where $w^*=w^{*\prime}$, and the other where $w^*>w^{*\prime}$.

(i) *If $w^*=w^{*\prime}$, then the uniform equilibrium set is given by $\{0\}\cup[w_1, w_2]$, where*

$$w_1 \equiv \underline{w}(k_2, \tilde{e}),$$
$$w_2 = \bar{w}(k_2, \tilde{e}). \quad (4.14)$$

(ii) *If $w^*>w^{*\prime}$, then*

$$w^* \in [w_3, w_4];$$
$$w^{*\prime} \in [w_3, \min\{w_2, w_4\}]; \quad (4.15)$$

describe the equilibrium sets for w^* and $w^{*\prime}$ respectively. Here

$$w_3 = \bar{w}(k_2, \hat{e}), \quad (4.16)$$

$$w_4 = \bar{w}(k_1, \hat{e}). \quad (4.17)$$

We omit a proof for lack of space, but it is available on request from the authors. However, here is some intuition for the result.

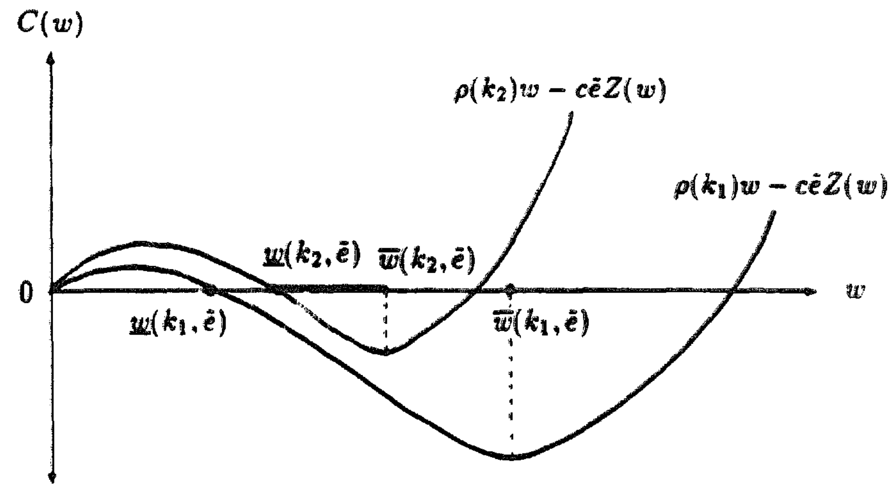

Fig. 7. The equilibrium set for two types of farmers when both pay the same wage, and $h(r, l) = cr$. *Note:* Thick lines indicate the equilibrium set.

First consider the case $w^* = w^{*\prime}$. Here, just as in section 4.1, all farmers in the village pay the same wage in equilibrium. Hence, any farmer deviating unilaterally from w^* will face the same probability of refusal as in section 4.1. The function $p(w, \theta, \mathbf{w})$ will be the same as the function $p(w, \theta, w^*)$ in section 4.1 and the modified cost function of an individual farmer will also be the same as $C(w, k, w^*)$ defined in section 4.1.

We illustrate diagrammatically a typical equilibrium predicted by the above proposition. Fig. 7 displays an equilibrium where both types of farmers pay equal wages. The reader can see that the equilibrium set is the intersection of the equilibrium wage sets of farmers k_1 and farmers k_2, each defined in the absence of the other type.

It has already been discussed in section 3.4 why in general the optimal wage of farmers with higher relative labour requirement in the slack is lower. For exactly the same reason, the equilibrium wage set when there are only type k_2 farmers is a subset of the corresponding set for type k_1 farmers.

In the more complicated case where $w^* > w^{*\prime}$ we begin by deriving the refusal probability function for an individual farmer paying any $w \geq 0$, when all other farmers pay w^* or $w^{*\prime}$ depending on their land holdings. The labourers may be divided into three groups.

(1) Those who feel that w^* is not a fair wage. For such labourers, *all* farmers are unfair and therefore, by assumption (R.3), they will be unable to punish a deviant.

(2) Those with notional fair wages higher than $w^{*\prime}$ but lower than w^*. For each of these labourers, $n_m = n$. Given the type of refusal function postulated here, they can punish the unfair farmers only if θ, or peak season labour demand, is sufficiently high.

(3) The remainder who feel that even $w^{*'}$ is a fair wage. Although they are the most lenient while deciding which farmer is unfair, they are the ones who can refuse offers most easily, since for them, all the equilibrium labour demand arises from fair farmers.

We shall denote the refusal probability by $p(w, \theta, w^*, w^{*'})$. Clearly,

$$
\begin{aligned}
&\text{if } w > w^*, && p(w,\theta,w^*,w^{*'}) = 0 && \text{for all } \theta,\\
&\text{if } w^* > w \geqq w^{*'}, && p(w,\theta,w^*,w^{*'}) = Z(w^*) - Z(w) && \text{if } \theta \geqq \hat{\theta}\\
& && = 0 && \text{if } \theta < \hat{\theta},\\
&\text{if } w^{*'} > w \geqq 0, && p(w,\theta,w^*,w^{*'}) = Z(w^*) - Z(w) && \text{if } \theta \geqq \hat{\theta}\\
& && = Z(w^{*'}) - Z(w) && \text{if } \hat{\theta} > \theta \geqq \tilde{\theta},\\
&\text{and, for any } w, && p(w,\theta,w^*,w^{*'}) = 0 && \text{if } \tilde{\theta} > \theta,
\end{aligned} \tag{4.18}
$$

where $\hat{\theta} = T(n)$ and $\tilde{\theta} = T(1)$.

The modified expected cost function may be denoted by $C(w, k, w^*, w^{*'})$ and it is

$$
\begin{aligned}
C(w,k,w^*,w^{*'}) &= \rho(k)w && \text{if } w \geqq w^*,\\
&= \rho(k)w + c\hat{e}(Z(w^*) - Z(w)) && \text{if } w^* \geqq w \geqq w^{*'},\\
&= \rho(k)w + c\hat{e}(Z(w^*) - Z(w^{*'}))\\
&\quad + c\tilde{e}(Z(w^{*'}) - Z(w)) && \text{if } w^{*'} \geqq w \geqq 0.
\end{aligned} \tag{4.19}
$$

In fig. 8, we have depicted an equilibrium with two types of farmers paying unequal wages. The cost function of farmers of type k_2, $C(w, k_2, w^*, w^{*'})$, decreases as w approaches $w^{*'}$, and increases thereafter. In fact, this function achieves its minimum at $w^{*'}$. Therefore, farmers k_2 have no incentive to deviate from $w^{*'}$.

Note that the cost function of farmers k_1, is decreasing in the range $[w^{*'}, w_4]$, and $C(w, k_1, w^*, w^{*'}) < C(w^{*'}, k_1, w^*, w^{*'})$ for all w in $[0, w^{*'}]$. Therefore, farmers k_1 have no incentive to deviate from w^*. Note that $w^* > w^{*'}$. So, all the necessary conditions are satisfied and both farmers are in equilibrium, paying different wages.

A point of interest is that the farmers' equilibrium sets shrink due to the presence of the other type. The common lower limit for the farmers'

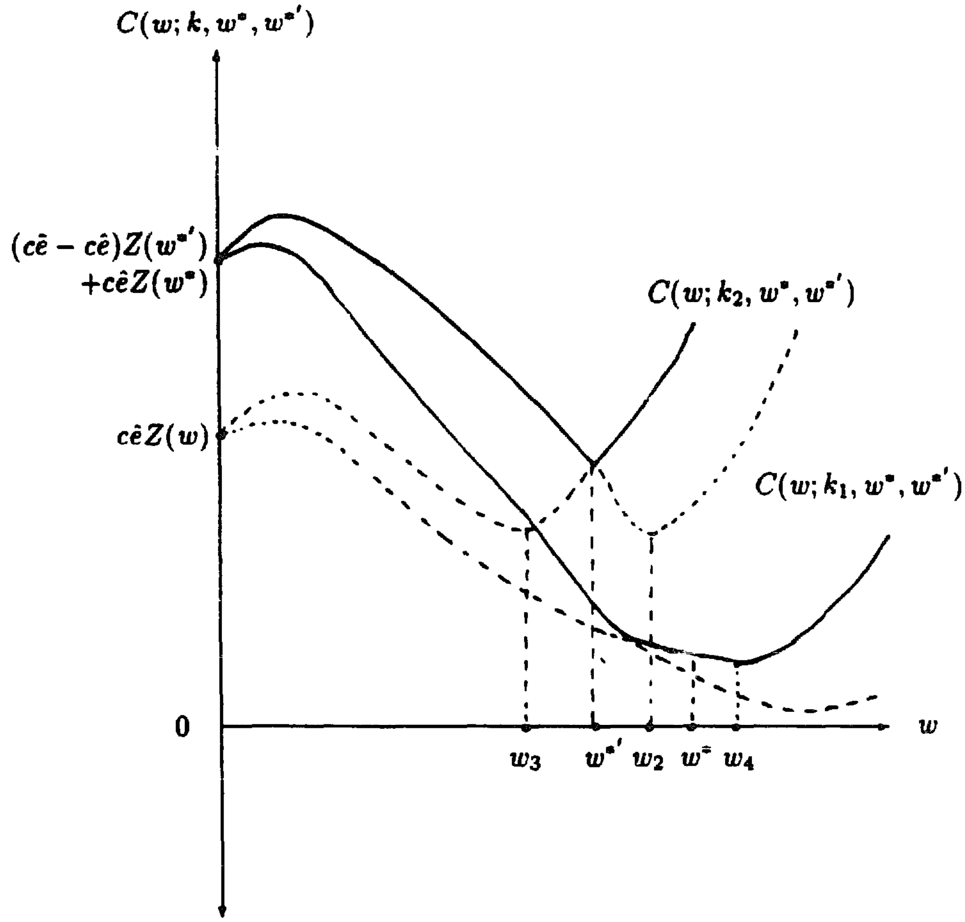

Fig. 8. An equilibrium with two types of farmers, and $h(r,l)=cr$. *Note:* Thick lines indicate the equilibrium set.

equilibrium sets is not ony strictly positive, but also higher than the lowest nontrivial wage payable by either type in isolation. The upper limit of the equilibrium set of farmers k_1 is lower than it would have been in isolation. The same will apply to farmer k_2 as well if $\tilde{w}(k_2,\tilde{e})>\hat{w}(k_1,\hat{e})$.

The reader can check that there are no two points in the range below the equilibrium wage where the costs are equal. Therefore, the equilibria depicted here are uniform equilibria.

5. How changes affect equilibrium wages

In this section, we shall conduct a number of exercises to demonstrate the wide range of implications of the model. For most of these exercises, it suffices to consider the one farmer case studied in section 4.1. However, there are some questions of separate interest that concern the interaction between farmers of different types, and for those we shall turn to the model of section

4.2. Although we consider only uniform wage equilibria here, they will be referred to simply as equilibria for brevity.

5.1. Seasonality

We have already remarked that the seasonal nature of agricultural production is crucial to our exercise. There are a number of ways to capture an 'increase' in seasonality. We consider two. First, suppose that there is a change in production technology so that for all farmers, the ratio of slack labour demand to peak labour demand *falls* in the one-farmer-type model.

Using Proposition 2, it is easy to establish that:

> *If the slack to peak labour ratio falls, then the set of equilibrium wages expands. In particular, the highest equilibrium wage increases.*

Fig. 9 illustrates this result for two special cases. Here ia a quick proof. (We omit similar arguments in the observations to follow.)

Suppose that ρ falls to ρ'. Let w^* be an equilibrium wage under ρ. We must show that it is an equilibrium under ρ'. Suppose not. Then, by Proposition 2, there exists a $w' < w^*$ such that

$$\rho' w' + \int_{\underline{\theta}}^{\bar{\theta}} \theta c(\bar{R}(\theta)\{Z(w^*) - Z(w')\})\, d\Pi(\theta) < \rho' w^*. \tag{5.1}$$

Because w^* is an equilibrium under ρ, we know that

$$\rho w' + \int_{\underline{\theta}}^{\bar{\theta}} \theta c(\bar{R}(\theta)\{Z(w^*) - Z(w')\})\, \mathrm{d}\Pi(\theta) > \rho w^*. \tag{5.2}$$

Combining (5.1) and (5.2), we see that

$$(\rho' - \rho)(w' - w^*) < 0. \tag{5.3}$$

But this contradicts our twin supposition that $\rho' < \rho$ and $w' < w^*$.

A *second* way of capturing changes in seasonality is to alter the distribution of the random variable θ. This, in turn, admits of two alternative interpretations. First, we say that there is an increase in seasonality if the stochastic distribution of θ *shifts* 'to the right', in the sense of first-order stochastic dominance. Under this interpretation, it is easy to use Proposition 2, our assumptions on the refusal cost $h(\cdot)$ and the refusal probability $R(\cdot)$ and arguments similar to those used above, to show that an increase in seasonality must *expand* the set of equilibrium wages.

Second, one might consider mean preserving spreads of Θ. Under this somewhat less plausible interpretation, an increase in peak season *uncertainty*

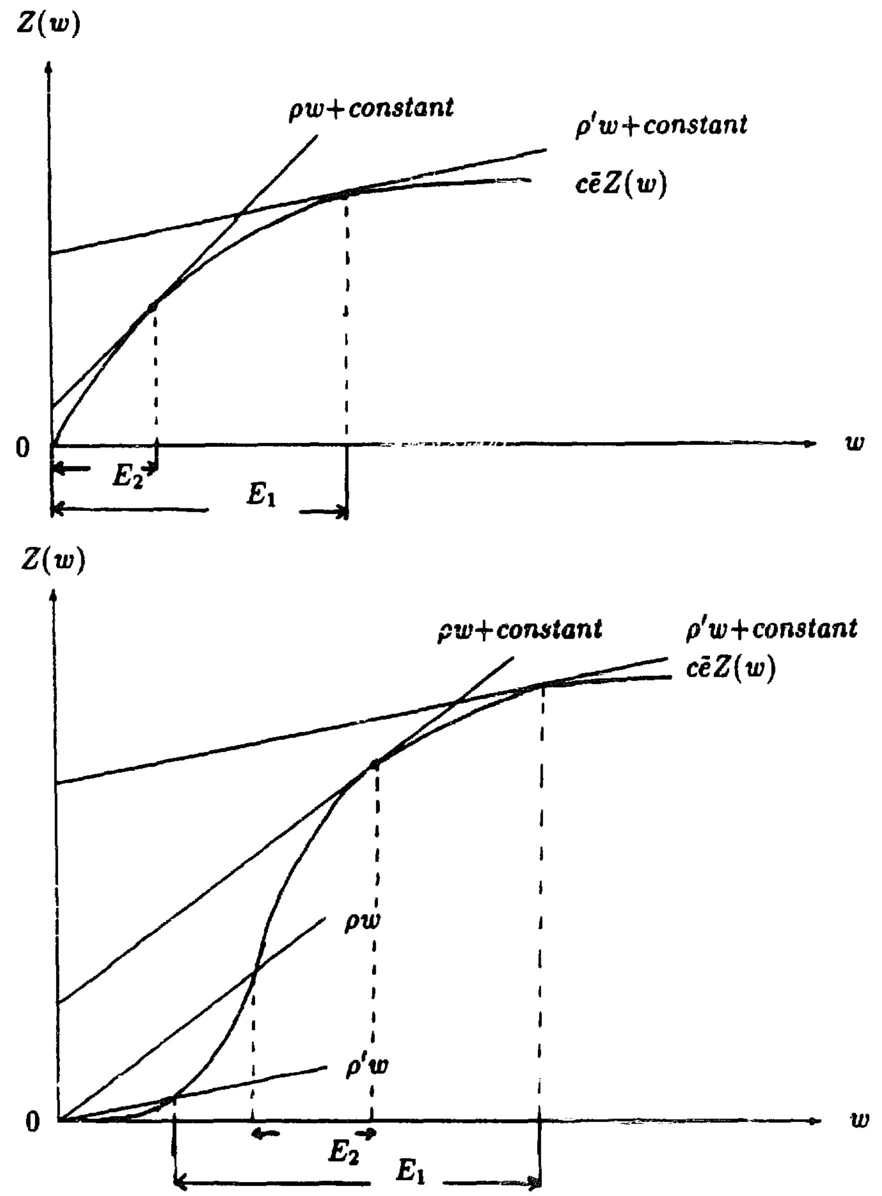

Fig. 9. Changes in the equilibrium sets as labour requirement ratio changes from ρ to ρ'.

would be akin to an increase in seasonality. The results here are correspondingly somewhat qualified. The reader can verify, for instance, the following: If the peak season costs (incurred by a farmer) are a convex function of the number of refusals, and if the refusal probability is convex in the employment rate, then an increase in peak season uncertainty does expand the equilibrium wage set (raising, in particular, the highest equilibrium wage).

5.2 Labour supply

Somewhat related to the issue of seasonality is the total labour supply to the village. It the supply of casual labour were to increase, ceteris paribus, this would decrease the significance of the seasonal component of agriculture.

However, an increased labour supply affects the outcome via a route entirely different from that of seasonality. By reducing the probability of refusal in the peak season, an augmented labour supply makes it more difficult to sustain non-reservation equilibrium wages. Proposition 2 can be used to formally establish that

An increase in labour supply contracts the set of equilibrium wages.

5.3. Real wage flexibility; money wage rigidity

Our model displays an interesting feature of money wage rigidity coupled with real wage flexibility, despite the complete absence of money illusion. The reason is at once simple and general.

Let the functional forms of the refusal costs and the refusal probabilities be fixed. Then the distributions $\Pi(\cdot)$ and $Z(\cdot)$ together with the functions $\rho(\cdot)$ and $c(\cdot)$ and other economically relevant parameters describe the economic '*environment*', E. An equilibrium wage has meaning only in the context of this environment. A crucial component of this environment has so far been kept implicit. It is the unit of measurement, or the *price* of the homogeneous crop.

Let us represent the money wage by ξ. The corresponding real wage is $w=\xi/p$, where p is the price of the crop. Let $W(E)$ be the set of all possible money wage equilibrium ξ, associated with an environment E. Recall that a nontrivial equilibrium set is an union of intervals. Therefore, for small changes in the environment, the intersection of the old and new money wage equilibrium sets will be non-empty. In case the former equilibrium wage ξ^* had been lying in that intersection, it will remain unchanged. *However*, the economic environment having undergone a change in the meanwhile, ξ^* now represents a *different* equilibrium.

An individual farmer chooses the money wages in the context of the existing prices, etc. (This distinction was not necessary before.) Observe that once the economy settles on a real wage w, it is not possible to move to another w' by means of unilateral *money* wage changes by individual farmers. That is, the choice of the corresponding money wage ξ is analogous to a Nash equilibrium.

However, consider the same real wage w', but this time brought about by an exogenous change in the price level, that is, $w'=\xi/p'$ for some new p'. In this case, the economy will display w' as the new equilibrium real wage. What could not be effected via changes in the money wage can be effected by a change in the price level, because the latter can mimic a *coordinated* 'deviation' by *all* farmers to a new self-sustaining wage equilibrium.

Our model, therefore, predicts that real wage changes are more likely to be brought about by a change in the price level rather than changes in the money wage. There has been a substantial literature in the Indian context which refers to the relatively low rise in agricultural wages as compared to agricultural output and incomes.[32] In Palanpur also, the slack money wage is always slow to rise. It remained unchanged from *kharif* of 1984 to *rabi* of 1987. In the meanwhile, the price of wheat had increased by about 40%. Such sticky money wages are common in other parts of India as well. For other examples, see Rudra (1982).

To summarize: our formulation leads naturally to a situation where a change in the real wage can be brought about by parametric changes, but not by changes in the money wage which remains 'sticky'. We repeat, this occurs in spite of the absence of money illusion.

5.4. Piece rate contracts

In the formal analysis of section 4, we assumed that all labourers observed the wage payments made by farmers in the slack reason. After all, it is only after this is known that a judgement on the fairness of a particular farmer is possible. However, this assumption is difficult to maintain if a piece rate contract is offered during the slack season. While the piece rate itself is observable, it may not be possible to precisely infer the implied *income* component from this information. The reason is that the task under contract may be of uncertain difficulty. Consequently, a low observed income accruing to a labourer may be due to: (1) a difficult task (the farmer has been unfair), or (2) poor application by the labourer himself (the farmer may not have been unfair). It follows that *other* labourers are faced with an additional degree of uncertainty in deciding whether the farmer has been fair or not.

The simplest way of capturing this feature within our model is to introduce an additional exogenous probability $h \in (0, 1)$, with the following interpretation. If a farmer pays a wage w in the slack season, and if labourer m considers w to be notionally unfair ($w_m > w$), then h represents the probability that labourer m will actually refuse such a farmer, conditional on his being *able* to do so (that is, eq. 3.1 holds). That is, h is the probability with which a labourer m will judge the farmer to have been unfair. In our model above, $h = 1$. If we adopt this interpretation, we can show that:

> *If a fixed fraction of slack season labour demand is on piece rate contracts, then the equilibrium income under a piece rate contract will be less than daily wage income in equilibrium.*

Therefore, our model is suggestive of the fact that if piece rate contracts

[32] See, for example, Bardhan (1977).

are offered side by side with daily wage contracts, the equilibrium income under the former will be lower.

As mentioned earlier, in the majority of cases, income from piece rates is lower than the income from daily wages in Palanpur. One might ask, then, why do we not observe all slack season contracts in the form of piece rates. The answer is simple: all slack season jobs do not have a fully observable output on which to condition the piece rate!

We are not suggesting that this explanation is the *only* reason why piece rate contracts yield a lower daily income. This is only one of a number of alternative explanations. One common explanation, for instance, is that piece rate contracts permit the labourer to consume more leisure. So daily income falls, but the *utility* level of the labourer remains unchanged. We recall, however, that this explanation is of doubtful validity in situations of widespread unemployment (see section 2.3).

5.5. *Collusive behaviour*

Suppose that farmers, instead of unilaterally choosing a wage, can pursue joint action in the following sense. A fixed fraction α can form coalitions and jointly decide on the wage. When $\alpha=0$, this reduces to the model of our paper. When $\alpha=1$, we are looking at the case of a single, monopsonistic employer.

It is easy to incorporate this into the model. Consider the homogeneous farmers model of section 4.1, and redefine the notion of equilibrium. A wage w^* is now an equilibrium if *no* group of farmers of size α or less can benefit by *jointly* deviating from w^*. This extension leads to the following comparative statics result.

> *If $W(\alpha)$ denotes the set of equilibrium wages when coalitions of size α can form, then $W(\alpha)\supseteq W(\alpha')$ whenever $\alpha\leqq\alpha'$. Moreover, $W(1)=\{0\}$, so that only the trivial equilibrium is an outcome under perfect farmer collusion.*

This result may be in apparent contradiction to Bardhan's result on the behaviour of monopsonistic farmers in the presence of recruitment costs. In his model, however, recruitment costs are independent of the farmer's actions, whereas, in our model they are very much related. That is why the two results are so different.

5.6. *Observations on two types of farmers*

We should mention at the outset that all the observations made in sections

5.1 to 5.5 are valid in the two-farmer-type case studied in section 4.2. They are, however, more transparent in the one farmer type model of section 4.1. We restrict ourselves to remarks that explicitly concern the interaction between farmers with different land holdings, and paying distinct equilibrium wages.

Leaving aside the cases mentioned above, we shall study the effects of changes in some parameters on the equilibrium sets of farmers. Let there be two types of farmers – farmers 1 and farmers 2 with labour requirement ratios ρ_1, ρ_2 respectively, such that $\rho_1 < \rho_2$.

Let the relative strengths of the farmers, that is, the proportion of peak season offers from farmers 1 (equal to n) change significantly. An increase in n will induce an upward shift in the equilibrium sets. The common lower bound of the equilibrium sets will rise. So will the upper bound of the equilibrium set of farmers 1, and the upper bound to the equilibrium set of farmers 2 may rise as well. These changes are caused by a shift in the refusal probability function, because refusal decisions are easier to take now.

We discuss the effects of a change ceteris paribus, in the labour requirement ratios. This discussion gives an idea of how the equilibrium sets will change with changes in $\Pi(\theta)$, L, or other parameters. We assume throughout that ρ_1 remains less than ρ_2.

Suppose ρ_1 decreases. The upper bound to equilibrium set of farmers 1 will rise. The same effect may be obtained on the equilibrium set of farmers 2. The lower bound will not change.

In case ρ_2 decreases, the common lower bound of the equilibrium sets will rise. The upper bound to the equilibrium set of farmers of type 1 will not be affected. The upper bound to the equilibrium set of type 2 farmers may increase.

6. Conclusions

To conclude, we summarize our main results.

We model a village economy, and examine equilibrium slack season wages in the presence of involuntary unemployment. Our model draws its inspiration from sociological notions of 'everyday peasant resistance', applied to a specific form: refusal to work. In particular, labourers can react to low wage payments in slack by engaging in protest during the relatively tight peak season. However, a refusal to work is not an automatic response in our model, and this decision is conditional on economic factors.

We obtain, in general, a continuum of equilibrium wage configurations. The set of configurations is completely characterized in some specific models. It turns out that all these configurations, barring one, involve wages that exceed the reservation wage, despite the presence of involuntary unemployment.

A number of qualitative observations follow. (1) With heterogeneous farmers, equilibrium wage differentials, if any, can be characterized in terms of slack-to-peak labour demand ratios. (2) Increased seasonality enhances the possibility of wage payments above reservation levels, showing that the seasonal nature of agriculture is crucial to our exercise. (3) Increased labour supply on the other hand, reduces this possibility. (4) The model predicts sticky nominal wages and relatively flexible real wages in the presence of parametric changes, despite the absence of money illusion. (5) The model suggests that piece rate incomes will be significantly lower than daily wage incomes, in equilibrium.

These and other observations are examined with respect to available empirical observations, in particular, the intensive survey carried out for the village Palanpur. In Palanpur there is a marked seasonality in employment and we have reason to believe that the slack season wage is greater than the reservation wages for some labourers, at least. In Palanpur, as well as in parts of West Bengal the wages have remained unchanged over a year[33] in spite of price changes in the meanwhile. Significantly lower income for piece rate wages as against daily wages has also been observed in the slack season in Palanpur.

[33]The reader can refer to, for instance, Rudra (1982) and Drèze and Mukherjee (1989).

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