DISNEYLAND MONOPOLY, INTERLINKAGE AND USURIOUS INTEREST RATES

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Interlinkage between labour and credit markets is interpreted as a consequence of a monopolistic moneylender's attempt to extract consumer's surplus from the borrower by levying a two-part tariff. This analogy enables us to draw on the literature on non-linear pricing to highlight issues in agrarian structure. The consequence of policy interventions, like taxes and minimum wage legislation, is studied. It is shown that the moneylender will charge 'usurious' interest rates if wages are rigid downwards or there is a tax on agricultural income or borrowers have heterogeneous preferences. Some geometry for analysing interlinkage is developed and used for deriving some of the results.

1. Introduction

There is a commonness in the schemes of (a) the Disneyland monopolist who charges a large entry-fee before allowing people access to the joy-rides in the park and (b) the rural landlord who gives credit only to those who are employed on his land or are his tenants: (a) relates to the well-developed literature on non-linear pricing¹ and (b) to the relatively recent and on-going research on interlinkage in factor markets in backward agriculture.² The aim of this paper is to analyse this commonness³ and to shed new light on the causes and consequence of interlinkages in rural markets by drawing on results in the literature on non-linear pricing and optimal taxation.

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¹ The modern literature, especially the Disneyland version of it, originated in Oi (1971) and was followed by, among others, Adams and Yellen (1976), Spence (1977, 1980), Guesnerie and Seade (1982) and Braverman, Guasch and Salop (1983). Variants of this, namely the tying-in problem or block tariffs, were discussed by Burstein (1960) and Gabor (1955).


³ The commonness between non-linear pricing and interlinkage that I formally analyse in this paper has been noted earlier by Bardhan who pointed out that Burstein's 'tie-in sales' is analogous to interlinkage. While this is true, I try to show in this paper that the analogousness is much more stark if, instead of Burstein's theory, we consider Oi's theory of two-part tariffs.
Several explanations have been suggested for the existence of interlinkage. The fact that lending money to strangers can be risky may mean that a moneylender would give credit only to those with whom he has other dealings. This would lead to an explanation of interlinkage as a kind of insurance [Basu (1983), Platteau (1983)]. Another explanation could be that, since the effort or effective labour put in by a tenant is beyond the landlord's control, interlinkage is used by the landlord as an instrument of indirect control of labour effort. This is the basis of works such as Braverman and Stiglitz (1982) and Mitra (1983).

A different line is pursued in this paper. Suppose rural credit markets are monopolistic. By this I do not mean that there exists only one moneylender in the rural region or locality, but simply that each borrower has access to only one moneylender. So there may be several moneylenders but each lender with his borrowers forms a little 'credit island' with meagre – and for the formal analysis, no – flow of money between these islands. Given that historical ties4 (e.g. the fact that i and j belong to the same caste and have lived in the same village since birth) generally reduce the risk of credit default, it is natural for lenders to prefer giving loans to those with whom he has historical ties. And this makes the description of a fragmented credit market a plausible one.

Focus now on one island with its monopolist moneylender who, we shall assume, happens to be also a landowner, and several potential borrowers. It can be shown that one way in which the moneylender-landlord can increase the surplus extracted from the borrowers is by offering them an interlinked deal whereby they could work as labourers at a wage below the normal rate and also take credit at a certain interest rate. So interlinkage here is a result of monopoly in one market, namely the credit market. It exists for the same reason that 'leverage' and 'tie-in sales' exist in industry – or rather would exist in industry if not for the Sherman Act and other legal provisions [Bowman (1957)]. This idea is presented in section 3.

Two shortcomings of the large recent literature on interlinkage are as follows. First, while there are models of high interest rates, in most models of interlinkage the natural tendency for rural interest rates is to get equated with the organised sector interest rate [see, for example, Braverman and Srinivasan (1981), Basu (1983)]. Secondly, in most models, borrowers are ex ante identical. While this assumption is normally made to look innocuous,

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4It is important to distinguish between historical and economic ties [see Basu (1984, p. 148)]. The fact that two persons belong to the same caste is an example of the former; the fact that one works for the other is an example of the latter. Default risk is reduced by lending to someone with either historical or economic ties. However, since economic ties can be contracted upon, if a person lends to those with whom he has economic ties, interlinkage occurs immediately. But if a person gives credit to someone with whom he has historical ties interlinkages does not occur automatically (since there can be no market for such ties). This paper however tries to show that even here factor markets may eventually get interlocked.
the popularity of its adoption is really caused by the fact that the case of non-identical borrowers is analytically difficult to model.

Interestingly, these two problems are closely related and solving one solves the other. It will be argued that one important cause of why interest rates are usurious or high is borrower heterogeneity. The modelling of interlinked markets with heterogeneous borrowers becomes tractable once we exploit the structural analogousness between interlinkage and non-linear pricing. I do this in section 5. It is shown that with heterogeneous borrowers, rural interest rates may be above the organised sector rate and also, given certain restrictions on inter-borrower preferences, interest rates will be lower for larger loans.

Interest rates could be high also because of certain kinds of fiscal policy. The existence of interlinkage means that a wage policy could have an immediate impact on the credit market and interest rates. Policy questions in general have received little attention in the literature on interlinkage, and consequently I go into these in some detail in this paper. It is known that in the presence of interlinkage if we try to achieve a certain objective via labour-market policy, it might get dissipated or reversed via credit-market response. This has led to the extreme view that tampering with one market may be useless. The effects of an agricultural income tax and minimum wage legislation are examined in this paper. The impact on interest rate is carefully worked out. I also address the ‘one market’ problem. Can worker welfare be increased by raising wages or would such a policy always get offset by adverse changes in the credit market? These and other questions are the subject-matter of section 4.

The formal analysis is initiated by briefly presenting the model of two-part tariff monopoly in the next section. A subsidiary aim of the paper is to offer some simple new geometry for analysing interlinked markets and two-part pricing.

2. The geometry of two-part tariff monopoly

Consider a monopolist selling hats to a single price-taking consumer. He charges a two-part tariff, \((T, p)\), where \(T\) is the ‘entry’ charge and \(p\) is the per unit price. This implies that if the consumer buys \(x\) units of hats he will have to pay \(T + px\), if \(x > 0\). Consider a two-good world where the other good has a price of \(1\) and the consumer has an income of \(y\) in fig. 1. If he does not buy hats, he can buy \(y\) units of the other goods and get a utility of \(u\). The indifference curve representing \(u\) is shown in the figure.

In the case where \(x_0\) is the number of hats the monopolist plans to sell, the maximum that he can earn is given by \(GJ\). This he does by setting \(p\) equal to the marginal rate of substitution at \(J\) and \(T\) equal to \(yA'\). Then the
budget set faced by the consumer is the point \( y \) and all points within \( OA'B' \) and clearly the consumer would be willing to buy \( x_0 \) units and pay \( GJ = yD \). It follows that if we draw a horizontal line through \( y \) and turn the diagram upside down, we could think of \( \tilde{u} \) as the total revenue (TR) curve faced by the monopolist charging a two-part tariff. Such a monopolist is called a Disneyland monopolist.

A monopolist who charges only a fixed price per unit (and has no entry charge) will be referred to as a traditional monopolist. In fig. 1, \( yE \) is the offer curve, i.e. the locus of equilibrium points on all budget constraints that can be drawn through \( y \). It is easy to see that \( yE \) is the TR curve (with the diagram turned upside down) for the traditional monopolist. Since the offer curve through \( y \) must lie above the indifference curve through \( y \), a Disneyland monopolist necessarily earns more than a traditional monopolist.

To find out how much these two types of monopolists will produce, draw the total cost (TC) curve upside down with \( y \) as the origin. Each type of monopolist will produce that output which maximises the vertical distance between the TC and the relevant TR curves. We may now move on to a central theme of this paper, namely interlinkage and its geometry.

3. An explanation of interlinkage

Suppose there are \( n \) labourers. Each can produce an output of \( q \) units. They have access to a competitive labour market where the prevailing wage equals the marginal product of labour, that is, \( q \). For credit, however, they can turn to only one landlord. The need for credit arises, in reality, for many reasons. Here, for the sake of simplicity, it will be assumed that there are two periods and wages are paid in period 2. In period 1, a labourer has to
borrow to finance consumption. If a labourer receives a loan of $L$ units in period 1 and has to pay it back in period 2 with interest, at a rate of $i$, and he gets a wage of $w$ units, his consumption stream in the two periods is given by $(L, w-(1+i)L)$. The utility that he gets from this is given by

$$u = u(L, w-(1+i)L), \quad u_1 > 0, \quad u_2 > 0.$$  

(1)

The function is assumed to be strictly concave and differentiable. To start with, it is being assumed that all workers have the same preferences. This will be relaxed in section 5. To find the labourer's demand function for loans we have to solve the following problem:

$$\max_{L} u(L, w-(1+i)L).$$

By solving this we get the amount of loan demanded by a labourer to be a function of $w$ and $i$:

$$L = L(w, i).$$  

(2)

Now consider the moneylender who has a monopoly in the credit market. It is assumed that he has access to the organised credit market where the interest rate is $r$. Hence, the opportunity cost to the moneylender of giving credit in the rural sector is $r$. We shall begin by assuming that the moneylender cannot discriminate between loans in terms of interest rate. He has to fix an interest rate, $i$, which he cannot then vary across borrowers or loans. If he acts like a traditional monopolist he will, confronted by the demand curve for loans, lend up to the point where the marginal revenue equals the marginal cost of lending which, in this model, is $r$. He will then set $i$ above $r$ in the usual way.

He can, however, earn a larger profit if he uses his monopoly power in the credit market to offer joint deals in the credit and labour markets. By insisting that a person must be his employee in order to get his credit and by paying his employees less than the wage rate in the competitive labour market, he can emulate a two-part tariff monopolist and extract the entire surplus from the labourers. This is the essential cause of interlinkage in this model.

Suppose the landlord offers a package, $(w, i)$. If a worker accepts this he has to work for the landlord for a wage of $w$ and he can take as much credit

$^{5}$Given interlinkage, the moneylender and the landlord happen to be the same person and is referred to in this paper as moneylender, landlord or moneylender-landlord.
as he wishes at an interest rate $i$. Assume the workers accept this package. Then the landlord’s profit, $II$, is given by

$$II(w, i) = n\{q - w + (i - r)L(w, i)\}.$$  

(3)

Remember that each worker produces $q$ units of output and confronted with $(w, i)$, takes a loan of $L(w, i)$, as specified in (2). We shall refer to $n(q - w)$ as the production income and $n(i - r)L(w, i)$ as the usurious income of the moneylender-landlord. It is being assumed that the output, $q$, produced by each worker is realised in the second period, which is also when the wage is paid and the loan repaid. It is worth noting that $q - w$ here plays the role which the entry fee plays in the Disneyland model.

Note that if a labourer rejects the offer $(w, i)$, he can always flee to the labour market where he gets a utility of $u(0, q) = \bar{u}$. This will be referred to as the reservation utility of the labourer. Clearly then the landlord, in designing his offer to the labourers, has to ensure that they get at least as much as their reservation utility. Hence, the landlord’s problem is

$$\max_{(w, i)} II(w, i)$$

s.t.

$$u(L(w, i), w - (1 + i)L(w, i)) \geq \bar{u}. \tag{6}$$

Solving this we get $(w, i)$ and, by using (2), we can then solve for $L$. Let the solution of this exercise be denoted by $(w^*, i^*, L^*) = E^*$. $E^*$ is, therefore, the equilibrium in this model. This completes the description of our basic model.

The characterisation of $E^*$ turns out to be a very easy exercise using the diagrammatic apparatus of section 2. It is clear that the landlord can treat the reservation indifference curve, $q_e$, as his TR curve with fig. 2 turned upside down and with $q$ being the origin. If he lends $L$ units to a labourer, the cost of this is $(1 + r)L$. Hence, if we draw a line through $q$ with a slope of $1 + r$, we could think of it as the TC curve facing the landlord. His optimum is therefore given by point $e$ where the slope of the reservation indifference curve equals $1 + r$. Hence, the landlord should offer a wage of $w$, as shown in fig. 2, and set $i$ equal to $r$. His profit from each labourer is given by $qw$ in fig. 2 and hence his total profit is this multiplied by $n$.

Viewed in this manner several standard theorems on interlinkage are easily understood. In this model all labourers get the same utility and each labourer gets as much utility as he would have got if he did not transact with the monopolistic moneylender and went to the labour market instead.

*This may, alternatively, be expressed as:

$$\max_{(L)} u(L, w - (1 + i)L) \geq \bar{u}. \tag{6}$$


The only difference is that he would be at point $e$ in one case and $q$ in the other. This is known in the literature as the utility equivalence theorem.

In the above analysis the indifference curve representing $\tilde{u}$ touches the vertical axis (at $q$). It may appear more reasonable to assume that as the consumption in period 1 approaches 0, the indifference curve should asymptotically approach the vertical axis. After all, some consumption in each period is essential. Fortunately, there is no need to deny this in our model. We could simply assume that a certain minimum consumption in period 1 is guaranteed to the labourer (by, for example, his relatives) and what the horizontal axis in our diagrams show (and what the first argument in a labourer's utility function represents) is consumption in period 1 over and above this minimum guaranteed level.

Let us define the rural interest rate as usurious if $i$ exceeds $r$. Note that in the above simple model the landlord would not charge usurious interest rates. However, this should not be equated with an absence of 'exploitation', for this landlord extracts more from the labourers than a traditional monopolist–moneylender.

In this model, interlinkage is an outcome of monopoly in one market. Interlinkage enables the landlord to extract the consumer's surplus from those who take credit from him or – to use legalistic jargon [Bowman (1957), Markovits (1967)] – it enables him to exercise 'leverage'. In some early literature and occasionally even now [Wharton (1962), Bharadwaj (1974)], it has been argued that interlinkage gives landlords greater power than monopoly. In a model such as the above one, this is an ambiguous observation because whatever earnings of the landlord can be attributed to interlinkage can, in turn, be attributed to monopoly.
The subject which we set out to explore now is the existence of usurious interest rates. There can be natural reasons for this but before going on to that, we focus on the effects of public policy on interlinked markets and, in particular, interest rates.

4. Price controls and the agricultural income tax

Let us first consider a special kind of price control, namely a minimum wage legislation. What I refer to as a legislation could instead be interpreted as a custom. The formal analysis will be the same. In the case of wages, many countries have minimum wage laws but these are not always enforced in backward rural areas. There may also exist social sanctions against paying too low wages and these can often impose effective constraints. Irrespective of whether their origin is the law or custom, we shall consider here the effect of a restriction on paying wages below \( w_G \). So now we have to think of the landlord as maximising his profit subject to the constraint stated in section 3 plus the constraint that \( w \geq w_G \). For the problem to be interesting \( w_G \) must be above \( w^* \). For simplicity I shall, throughout this section, assume \( n = 1 \).

Let us denote the equilibrium wage and interest as \( \hat{w} \) and \( \hat{i} \) in the presence of such a minimum wage restriction. It is simple to show that \( \hat{w} = w_G \) and \( \hat{i} > r \). Let us begin by assuming that \( \hat{i} \leq r \). Clearly then the landlord cannot be earning more profit than \( (q - w_G) \). This follows from (3) and is also obvious from fig. 3. Now if the landlord sets \( w \) equal to \( w_G \) and \( i \) a little above \( r \) (taking care
not to lose the customer), it follows from (3) that he will earn more than \((q - w_G)\).
Hence, the first situation could not have been a profit-maximising one. This contradiction implies that \(i > r\).

Now suppose \(\hat{w} > w_G\). We have already seen that \(\hat{i} > r\). Now choose \(w\) and \(i\) such that (i) \(w \in [w_G, \hat{w}]\), (ii) \(\hat{w} - w = (\hat{i} - i)L(\hat{w}, \hat{i})\) and (iii) \(i > r\). It is easy to check that such \((w, i)\) exists. Basically, \((w, i)\) offers the labourer a Slutzky-compensated budget constraint. It follows from (ii) that \(i < \hat{i}\). Since a Slutzky-compensated demand curve is downward sloping, it follows that \(L(w, i) > L(\hat{w}, \hat{i})\). Using (3) we get

\[
\Pi(w, i) - \Pi(\hat{w}, \hat{i}) = \hat{w} - w + (i - r)L(w, i) - (\hat{i} - r)L(\hat{w}, \hat{i}) = (i - r)(L(w, i) - L(\hat{w}, \hat{i})), \text{ by (ii)}
\]
\[
> 0, \text{ by (iii)}.
\]

This is a contradiction. Hence \(\hat{w} = w_G\). What we have proved is the following theorem.

**Theorem 1.** If a minimum wage, \(w_G\) (\(> w^*\)), is imposed, the landlord will pay the minimum wage and charge usurious interest.\(^7\)

It is interesting to examine the effect of a minimum wage on worker’s welfare. Let \(\bar{u}\) be the reservation indifference curve of a labourer in fig. 3. Let \(e\) be the point of tangency of the budget constraint drawn through \(w_G\) with the indifference curve \(\bar{u}\). If the landlord offers this budget constraint, he will earn a profit of \(ef\). Now draw the offer curve for the labourer when the budget constraint pivots around \(w_G\). Clearly, this curve must pass through \(e\). From Theorem 1 we know that the wage is equal to \(w_G\). This offer curve represents the TR curve of the landlord (viewed upside down with \(q\) as origin). Through \(e\) draw a line, \(AB\), which has a slope of \(1 + r\). If the offer curve lies above this line to the right of \(e\), then \(e\) is the best point from the landlord’s point of view and equilibrium will occur there. In this case the worker’s welfare remains unchanged because he remains on his reservation utility level. If the offer curve lies somewhere below \(AB\), to the right of \(e\), as does the broken curve in fig. 3, then there exists points on the offer curve which earn the landlord larger profits than \(e\). In that case equilibrium will occur at a point like \(g\) where the labourer is on a higher utility level than \(\bar{u}\). Hence, though a minimum wage restriction raises interest, it may leave the labourers better off, on balance.

\(^7\)This result is analogous to a theorem in the taxation literature [Atkinson and Stern (1974, appendix)] which asserts that if there is a restriction on the maximum lump-sum tax that may be imposed and if commodity taxes are optimal, then an increase in the lump-sum tax would enhance welfare. If, in addition, there is an assumption that taxpayers have a reservation utility below which they must not or cannot be pushed, then it follows that the commodity tax ought to be wielded only when there is a restriction on the lump-sum tax.
Based on this theorem one could hazard a tentative hypothesis about the movement, over time, of interest rates and wages. It has been argued that individual landlords find it difficult to give wages at variance with the prevailing norm [see, for example, Bliss and Stern (1982)]. Hence, it may be argued that when wages fall, this is preceded by a period when a downward tension develops but wages nevertheless do not fall because of the working of social sanctions on each employer. It is only when the pressures of supply and demand become too much that wages fall. Hence, during the period before a wage decline it is as if there is a minimum wage legislation. Therefore a wage decline should be preceded by a period when interest rates rise (by Theorem 1). And when wages actually begin to fall, it is like the lifting of a minimum wage legislation, so interest rates would be expected to fall as well.

Finally, given the amount of controversy that has been generated in India regarding the agricultural income tax, it may be interesting to examine the impact of this in the context of our model. It is very likely that even if a government would ideally like to impose a tax on total agricultural profit, i.e. \( P(w, i) \), sheer manageability considerations will make it unwise to try and tax usurious income. Also, such a case is analytically easy and uninteresting. So we shall focus here on a proportional income tax on production income only.

Let \( t \) be the fraction of production income which the landlord has to pay as tax. Hence, the landlord's maximand becomes:

\[
\Pi(w, i) = (1 - t)(q - w) + (i - r)L(w, i).
\]  

(4)

The impact of such a tax is summarized in the next theorem.

**Theorem 2.** If a proportional income tax is imposed on the landlord's production income, then the rural interest rate will exceed \( r \) and the wage will exceed \( w^* \).

Let \((\hat{w}, \hat{r})\) be the equilibrium wage and interest after the tax \( t \) is imposed. We have to prove \( \hat{r} > r \). Assume \( \hat{r} \leq r \). Define a function \( w(i) \) implicitly by

\[
\max_{u(L, w(i) - (1 + t)L)} = \max_{u(L, \hat{w} - (1 + \hat{r})L)}.
\]

Basically, as \( i \) is changed, \( w(i) \) is the change in wage which keeps the labourer on the same indifference curve. Now define \( \Omega(i)\equiv \Pi(w(i), i) \). Hence, by (4), \( \Omega(i) = (1 - t)(q - w(i)) + (i - r)l(i) \), where \( l(i)\equiv L(w(i), i) \). Hence,

\[
\Omega(i) = -w'(i) + tw'(i) + (i - r)l'(i) + l(i)
\]

\[= tw'(i) + (i - r)l'(i), \] by Shephard's Lemma.
If \( i = \hat{i} \), then

\[
\Omega(\hat{i}) = tw(\hat{i}) + (\hat{i} - r)f(\hat{i}).
\]

By the definition of function \( w(i) \), it follows that \( w'(i) > 0 \). And since \( i = r \), hence \( \Omega(\hat{i}) > 0 \). Hence, \( \hat{i} \) cannot be the optimum. This contradiction established \( \hat{i} > r \).

Since the labourer must remain on or above the reservation indifference curve, if the interest rate is higher, so is the wage. This completes the proof of Theorem 2.

An income tax imposed on the landlord may or may not raise the level of labourers' welfare. The argument is similar to the case of minimum wage legislation discussed above and is left to the reader to work out using a similar diagrammatic technique.

5. Usurious interest rates

A 'natural' explanation of usurious interest rates – as opposed to the policy-engineered ones discussed in the previous section – becomes possible once we drop the assumption, so widely used in the literature on interlinkage [Braverman and Srinivasan (1981), Mitra (1983), Basu (1983)], that all labourers have identical preferences. The case of non-identical labour would have been very difficult to handle if we had to begin from scratch. But this becomes a simple exercise if we can suitably draw on the work on non-linear pricing with heterogeneous consumers. There can be various ways of dropping the assumption of homogeneous tenants. Braverman and Guasch (1984) have explored the case of heterogeneity in the productivity of labourers. In what follows, heterogeneity exists only in preferences. Also, in my model, credit is not rationed. Labourers are free to take as much credit as they wish.

Along with labour heterogeneity, we shall assume that there exist social sanctions against discrimination between labourers. For, if the landlord is free to discriminate, then it is best for him to set \( i = r \) for all labourers and vary \( w \) so as to extract all consumer's surplus from each labourer, as in section 2.

Non-discrimination can be modelled in various ways and two of these will be considered here. First, the case where the landlord has to offer a unique package \((w, i)\) to all labourers is taken up. In the second case, we allow the landlord to offer many packages but he has to offer these packages to the labourers anonymously, that is, anyone can take up any package.

The case where the landlord has to offer a unique package can be intuitively analysed. Suppose there are different kinds of labourers, some who
need credit more 'intensely' than others (in a sense to be made precise later). If now the landlord sets \( i=r \), he earns nothing from his loans [see (3)]. His entire earning has to come from production income, i.e. \( q-w \). This means that he would not manage to extract more from those who need more credit. One way of extracting more from such people is to set \( i \) above \( r \). It is in this that the idea of usurious interest lies.

Before going on to formalise this, it is worth noting that this idea has antecedents which go back to some writings on anti-trust law in the 1950s. I quote from a remarkably lucid paper by Bowman (1957, pp. 23–24) where he is discussing a case between Heaton-Peninsular Button-Fasteners Co. and Eureka Speciality Co.:

A machine was invented for stapling button to high-button shoes [and the] machine was worth more to the more intensive users. If the patentee attempted to sell it at different prices to different users, however, he would have encountered two problems. To determine in advance how intensively each buyer would use the machine would have been difficult; to prevent those who paid a low price from reselling to those who paid a high price might have proved impossible. A tie-in would resolve these difficulties. The machine might be sold at cost, on condition that the unpatented staples used in the machine be bought from the patentee. Through staple sales the patentee could obtain a device for measuring the intensity with which his customers used the machines. Hence by charging a higher than competitive price for the staples the patentee could receive the equivalent of a royalty from his patented machines.

Before going on to consider usurious interest let us first establish the more general proposition that if there is heterogeneity in the preferences of labourers and the landlord is not allowed to discriminate between labourers, the interest rate charged by the landlord will (except in coincidental cases) differ from the organised sector interest rate. In other words, heterogeneity destroys perfect arbitrage in the credit market. This is very easy to demonstrate diagrammatically.

Let \( \tilde{u}^1 \) and \( \tilde{u}^2 \) be the reservation indifference curves of persons 1 and 2, as in fig. 4. Each curve consists of two straight-line segments. In each case the steeper segment is steeper than \( 1+r \) and the flatter segment flatter than \( 1+r \).

Now consider the landlord's problem. If the landlord faced only labourer 1, what \( (w,i) \) would he offer? It is easy to see that he would offer any package which would make point \( E \) person 1's equilibrium point. Similarly, if he faced only person 2, he would devise a \( (w,i) \) package so as to pin down labourer 2 at point \( F \). Now, if he faces both 1 and 2 together and has to offer a unique \( (w,i) \) package to both, what should he do?
Clearly he should set \( w \) equal to \( OB \) and \( 1+i \) equal to the slope of line \( BA \) (which is formed by joining \( E \) and \( F \) and extending). In other words he offers labourers the budget set \( OBA \). Given this budget set, 1 will choose point \( E \) and 2 point \( F \). Clearly, there is no reason why \( i \) should be equal to \( r \). As in fig. 4, \( i \) may be usurious, or \( i \) may be less than \( r \). Hence, if we now look at the profile of interest rates charged by different landlords we will get a diverse variety of interest rates and they need not equal the organised sector rates.\(^8\) Though I have established this with kinked indifference curves, these results will be valid in more general cases. However, if indifference curves are smooth, the landlord will not be able to extract the entire surplus from both labourers as in the above illustration.

What we have is established is this:

**Theorem 3.** If preferences among labourers vary and the landlord is constrained to offer a unique wage and interest, then there exist preference structures for which the interest rate is usurious.

Without violating labourer anonymity, the moneylender-landlord could be given another degree of freedom. We may consider the case where instead of offering a unique package the landlord offers a vector of packages. Anonymity or non-discrimination in this case requires that he does not differentiate between labourers, in the sense that the vector of packages is thrown open to all labourers and each is left free to choose any. What will the interest rates look like in such a situation? I give here an answer to this question using a well-known theorem in non-linear pricing [see, for example, Spence (1980)] along with a generalisation of it [see Basu (1985)].

For the sake of easier exposition we need to introduce some notation.

\(^*\)This is consistent with the empirical findings reported in Bardhan and Rudra (1978)
Instead of thinking of the landlord offering a wage and an interest, we shall think of an offer as a specification of consumption in periods 1 and 2. An offer \( \langle L, C \rangle \) means that if a labourer accepts this he will have to work for the landlord and will get \( L \) units of consumption in period 1 and \( C \) units in period 2. Now while we do allow labour heterogeneity, we will impose some restriction on interpersonal preference differences. Let \( s'(L, C) \) be the (negative of the) slope of person \( i \)'s indifference curve at \( (L, C) \). Now suppose that the \( n \) labourers can be grouped into \( t \) types of labourers. There are \( \theta_j \) labourers of type \( j \). Hence \( \sum_{j=1}^{t} \theta_j = n \). We assume that for all \( j \) a labourer of type \( j+1 \) needs credit with a greater intensity than a type-\( j \) labourer. This we assume to be true in the following sense. Let \( u' - u'(L, C) \) be the utility function of a person of type \( i \). It is strictly concave and differentiable. We assume that for all \( (L, C) \) and for all \( i \):

\[
\frac{u'_i(L, C)}{u''_i(L, C)} < \frac{u'_{i+1}(L, C)}{u''_{i+1}(L, C)},
\]

which may be rewritten in brief as

\[
s'(L, C) < s'_{i+1}(L, C). \tag{5}
\]

The landlord offers \( T \) packages, \( \{ \langle L_1, C_1 \rangle, \ldots, \langle L_n, C_n \rangle \} = \{ \langle L_i, C_i \rangle \} \) and labourers are left free to choose any. It is a question of nomenclature and I assume that a labourer of type \( i \) chooses \( \langle L_i, C_i \rangle \). That is,

\[
u'(L_i, C_i) \geq u'(L_j, C_j), \quad \text{for all } j. \tag{6}
\]

and

\[
u'(L_i, C_i) \geq u'(0, q). \tag{7}
\]

Expression (7) captures the fact that individuals are free not to accept any package and to go to the competitive labour market where a wage of \( q \) is assured.

The landlord's profit is given by

\[II(\{ \langle L_i, C_i \rangle \}) = nq - (1 + r) \sum_{i=1}^{t} \theta_i L_i - \sum_{i=1}^{t} \theta_i C_i. \tag{8}\]

The landlord's aim is to choose a \( t \)-tuple of offers \( \{ \langle L_i, C_i \rangle \} \) so as to maximise (8) subject to (6) and (7). Let the solution to this problem be denoted by \( \{ \langle L_*, C_* \rangle \} \).

Our aim is to characterise this solution in terms of interest rates and
wages. If a person \( j \) chooses a consumption stream \( \langle L, C \rangle \) we may define the (implicit) interest rate, \( i(L, C, j) \), and wage, \( w(L, C, j) \) as follows:

\[
i(L, C, j) = s'(L, C) - 1,
\]

\[
w(L, C, j) = s'(L, C) \cdot L + C.
\]

These are called the interest rate and wage associated with point \( \langle L, C \rangle \) for person \( j \) because it is easy to see (using fig. 2) that if a person \( j \) faces a wage-interest package given by \( i(L, C, j) \) and \( w(L, C, j) \), then he will optimally choose the point \( \langle L, C \rangle \).

By a generalisation of a well-known theorem in non-linear pricing it can be shown that the maximisation of (8) will yield a solution with the following properties:

- the marginal rate of substitution of a person of type \( t \) at \( \langle L^*, C^* \rangle \) equals \( 1 + r \), and for all \( i < t \), the marginal rate of substitution of a person of type \( i \) at \( \langle L^*_i, C^*_i \rangle \) is greater than \( 1 + r \).

Translating these results, so as to state them in terms of interest rates, yields the following proposition.

**Theorem 4.** If individuals have differing credit needs such that they can be arranged so as to satisfy (5) and if landlords are free to offer several packages but are not allowed to discriminate, then all persons with the greatest credit need will be charged an interest rate equal to the organised market interest, that is, \( r \); all other labourers will be charged usurious interest rates.

This theorem has an obvious, but in this context interesting, corollary. In fig. 5, let \( \langle L^*_i, C^*_i \rangle \) be denoted by \( e_i \). It of course lies on the indifference curve of a person of type \( t \). Consider a person of type \( i \) \( (i < t) \) and let \( e_i \) denote \( \langle L^*_i, C^*_i \rangle \). Obviously, \( e_i \) lies on the indifference curve of a labourer of type \( i \). Let us label these two indifference curves \( u' \) and \( u' \). At the point of intersection of \( u' \) and \( u' \), i.e. at point \( z \), \( u' \) must be steeper than \( u' \) because of (5). It follows that \( e_i \) lies to the left of \( z \) and \( e \) to the right. For, if \( e \) was to the left of \( z \) (and on the \( u' \) curve) then labourers of type \( i \) would choose point \( e' \) rather than \( e' \) thereby contradicting constraint (6) of the maximisation problem. A similar argument implies that \( e' \) must be to the left of \( z \). Hence, for all \( i < t \), labourers of type \( i \) take a smaller loan than \( t \). Since, by Theorem 4, labourers of type \( i \) pay a higher interest than those of type \( t \), we have this proposition.

**Corollary 1.** Individuals who take the largest amount of loan pay the lowest interest rate. All those who take smaller loans, pay usurious interest rates.

\(^9\)For a statement of the standard theorem, see Spence (1980) and Phillips (1983). This version makes crucial use of a strong restriction on individual utility functions. By using an alternative mode of proof this restriction can be shown to be redundant [Basu (1985)]. Seade (1983) has established this result without the restrictive assumption on individual utility functions but assuming that there is an infinity (and, in particular, a continuum) of consumer types.
6. Conclusion

Interlinkage is a phenomenon that can arise for various reasons. This paper explored a line of argument in which monopoly in one market generates forces which lead to the interlocking of this market with another one. It is an institution which enables the landlord to extract consumer’s surplus from his labourers. This kind of interlinkage is analogous to the tie-ins and two-part tariffs which have been a subject of much research in industrial pricing theory. This paper made use of this structural commonness to explore the impact of various fiscal policies on a rural economy with interlinkage between labour and credit markets, and also to examine the effect of ex ante heterogeneity among labourers on rural interest rates. It was shown that such heterogeneity in a labour market in which there are social sanctions against discrimination between workers could provide an explanation for the existence of usurious interest rates.

References


Bardhan, P., 1984, Land, labour and rural poverty (Columbia University Press).

Basu, K., 1985, Notes on nonlinear pricing and monopoly, Development Economics Research Centre Discussion paper (University of Warwick).
Bharadwaj, K., 1974, Production conditions in Indian agriculture, Cambridge University Press.
Bharadwaj, K., 1974, Production conditions in Indian agriculture, Cambridge University Press.