Australian Journal of Agricultural Economics, Vol. 28, No. 1 (April 1984), pp. 15-32.

USUFRUCT AND USURY: AN ANALYSIS OF LAND LEASING IN EAST JAVA*

N. H. STURGESS, HESTI WIJAYA† and N. DOW
University of Melbourne, Parkville, Vic. 3052

On Java, land leasing functions as a credit instrument when the entire rent is paid in advance. The rights obtained by the tenant/lender are the 'price' of the loan made to the land owner/borrower. A model of such transactions shows that the area leased and duration of the lease are substitutes in raising a loan of given size and that the substitution rate is related to the term structure of interest rates.

It has been argued elsewhere that four contracts found in rural Java (*tebasan*, *ijon*, *sewa* and *gade*)[1] by which land or its produce are leased can, and do, function as credit instruments (Wijaya and Sturgess 1979; Wijaya 1981). The finding that *sewa* (the contract whereby land is leased for a given time for a cash rent) is a borrowing/lending arrangement, and that the four contracts are discrete examples on a continuum of similar contracts, was derived from observations of this contract in two villages near Malang in East Java.[2]

The major reasons for concluding that *sewa* functioned as a credit arrangement in these villages were:

(a) the entire rent for the period of the lease was paid as a lump sum at the time the contract was negotiated, even if the tenant/lender had to wait (sometimes several years) before being able to work the land;[3]
(b) all the land owners who leased land stated that they did so because they needed cash;
(c) all the tenants stated that they had been approached by the land owners requesting a lease because the owners needed cash; and
(d) most tenant/lenders owned land and, like the landlord/borrower, few saw leasing arrangements as a long-term means of property management.

* We dedicate this article to the memory of David Penny who provided encouragement during the early stages of this research.

† Hesti Wijaya is currently at Brawijaya University, Malang, Indonesia.

[1] *Tebasan* is a contractual arrangement whereby a farmer sells a standing crop which is almost ready for harvest to a 'middleman' (*penebas*) who harvests and sells the produce. *Ijon* (derived from the Javanese word for green) covers an amazing variety of credit transactions which are characterised by borrowing cash (usually) and repaying in kind (always) (Partadireja 1974). In the agricultural context, the farmer (borrower) transfers his rights in a green crop to the lender for payment in cash several months before harvest. The lender continues the husbandry of the crop and harvests and sells the produce. *Sewa* is the contract closest to what most economists would view as leasing land for cash. *Gade*, or land pawning, is an extension of *sewa* whereby a tenant/lender gains the rights to use the land of an owner/borrower in exchange for a cash loan. The tenant works the land for an indefinite period until he is repaid in cash. For further details of these contracts see Wijaya and Sturgess (1979).

[2] See Wijaya (1981, Ch. 4) for detailed descriptions of these villages and the sampled farms within them. A brief summary is also given in Wijaya and Sturgess (1979).

[3] This might occur because the land was being used at the time of negotiation and payment; for example, the owner may have a crop on the land or it may be subject to an existing rental agreement.

Most of the loans raised in this way were used for consumption purposes, such as financing ceremonies and housing alterations. Versatile credit of the type provided by these loans is difficult, if not impossible, to obtain from formal institutions.

Other explanations for paying the entire rent in advance might include the land owner's desire to avoid the effects of inflation on a fixed annual rent, or a desire to avoid the uncertainty that an annual rent might not be paid. These explanations are rejected as the sole reason for the payment of rent as a lump sum in advance because of the owners' and tenants' statements about the way they use the *sewa* contract. This function of the *sewa* contract in Indonesia has been observed by other researchers, for example Horikoshi (1976, p. 130), and similar contracts were used as credit instruments during the early Norman era in England (Currie 1976, p. 10). The unique costs and risks associated with this method of borrowing and lending are discussed by Wijaya and Sturgess (1979, pp. 91-3).

In this paper some characteristics of cash leasing arrangements for land (*sewa*) are analysed where contracts are used as a credit instrument. The analysis focuses on cash as the commodity of interest, the price of which is a set of rights to land. Particular emphasis is given to a model of such leases in which the area leased and the duration of the lease are substitutes in raising a given size of loan. The model is based on the assumption that the set of rights received by the tenant/lender, when exercised, give the opportunity to obtain repayment of the principal of the loan plus interest. It has been suggested that usufruct is a means whereby explicit interest (usury) can be avoided—possibly in deference to Islamic Law (Firth 1964).

A Model of Fixed Payment Leases

First a conventional treatment of leasing is considered in which the commodity of interest is a set of rights to land with price measured in money; second, consideration is given to the 'mirror image' with money as the commodity of interest whose price is a set of rights to land.

Fixed land area, variable duration of lease

Assume a unit area of a particular type of land where all units of that land at a given location (say, village) are homogeneous with respect to fertility, climate and improvements. The rights to use that land, or crops growing on it, for specified periods of time can be traded. Given that the time scale is infinite and perfectly divisible, the set of rights embodied in each contract is directly proportional to the length of time of the lease. In practice, however, the seasonal nature of agricultural production means that the duration of leases is not perfectly divisible. Thus, *sewa* contracts tend to involve discrete numbers of seasons or years, but within a season greater divisibility might be expected for *ijon* and *tebasan* contracts. Therefore, as a working proposition, each duration of lease can be regarded as a distinct and well-defined commodity. Thus, a *sewa* contract for two years is one commodity while a three-year lease is another well-defined commodity. If the time scale were truly perfectly divisible it might be imagined that any given length of lease would be surrounded by a number of close substitutes. In practice, close substitutes may be confined to the very short leases within a season (*tebasan* and *ijon*) and the very long leases. Correspondingly, the rights of ownership (land purchase) can be considered as a lease for infinite time and represent a commodity different from a lease of, say, one hundred years.

Following Currie's (1981) view of land rental and purchase markets, two groups of individuals (not necessarily mutually exclusive) may be identified for a given duration of lease: the owners of land or crops (potential borrowers) and potential tenants (lenders). Each prospective tenant is assumed to have some lump sum 'offer rent', defined as the maximum price he is prepared to pay for the unit of land under that lease. If the market rent exceeds his offer rent he will not be willing to accept that lease; if the reverse is true he will wish to rent and if the market rent equals his offer price he will be indifferent to leasing. Correspondingly, each land owner is assumed to have a lump sum 'reservation rent', defined as the minimum price he is prepared to accept for the set of rights embodied in the length of lease. If his reservation rent is greater than, less than, or equal to the market rent, he will lease, not lease, or be indifferent between these options. The market demand curve for that commodity (duration of lease) can be obtained by ordering potential tenants in terms of their offer rents. The supply curve can be obtained by ordering land owners in terms of their reservation rents. The intersection of the demand and supply schedules indicates the equilibrium number of transactions and rent for that particular duration of lease. The difference between the equilibrium number of units being transacted for that lease and the total supply of land units is the number of units allocated to other uses. These other uses will include owner-operation and other durations of lease.

Up to this point it has been assumed that the set of rights to the unit area is the commodity of interest the price of which is determined in money. Taking the mirror image of these transactions, the amount of money (the lump sum rent) is the commodity of interest the price of which is measured by a set of rights. In this view of the market, the amounts of money (loans) can be considered as separate and well-defined commodities. The offer 'prices' will be the maximum set of rights (duration of lease) which each land owner (borrower) is prepared to surrender in exchange for that amount of money. The reservation 'prices' will be the minimum set of rights (duration of lease) which each tenant (lender) is prepared to accept for that amount of money. The demand curve for the particular loan can be obtained by ordering borrowers (land owners) in terms of durations of lease they are prepared to offer. The supply curve can be obtained by ordering lenders (tenants) in terms of the durations of lease they are prepared to accept. The intersection of the supply and demand curves indicates the equilibrium number of transactions of that size of loan and the equilibrium 'price' (duration of lease). The difference between the equilibrium number of units of this loan and the total supply of loanable funds represents the amount of funds allocated to other uses, including other types of debt instruments and other lending/leasing transactions.

This simple model can provide only the barest framework for analysing this extremely complex process of borrowing and lending. In reality the markets for each size of loan will be closely interrelated because the 'offer rights' of borrowers and 'reservation rights' of lenders for a particular size of loan will be influenced by the markets for all other sizes of loan. These interrelated markets must be viewed as operating simultaneously to determine the equilibrium durations of lease and the number of transactions for each size of loan. It is likely that similarly complicated influences will affect the reservation rights and offer rights of the agents as affect offer prices and reservation prices in the alternative view of the market (Currie 1981, Chs 6 and 8). For example, using the net present value hypothesis, lenders will be concerned with the anticipated net present value of the earnings from the set of rights they will accept relative to other uses of their funds over a similar period of time. If the net earnings from all the leases are viewed as returning to the lender both principal and interest, it can be hypothesised that the interest rate implied in the lender's minimum duration of lease will be related to the rate obtainable on other types of loans for similar periods of time. Conversely, borrowers might be expected to base their offer rights on the anticipated net present value of using that set of rights in alternative ways, including working the land themselves. Borrowers will also be concerned with the interest rate implied in their offer rights relative to other sources of finance for the purpose for which the loan is required.

These simple views of the lending/leasing market, in turn, suggest that there is likely to be a close relationship between the prices of various durations of lease and financial markets in the village communities. In the fragmented financial markets of rural Java, where supplies of loanable funds for some purposes, particularly for consumption purposes, from formal lending institutions are severely constrained or non-existent, these relationships are likely to be extremely difficult to unravel. An example of this difficulty is provided by Stoler's (1977) observation that 'prices' can be influenced by social ties between the contracting agents.

As a result of all these forces which bear on the lending/leasing market it might be expected that the equilibrium prices for a unit area, payable as a lump sum, would increase with the duration of the lease. If net returns from farming the unit at the present time are expected to continue indefinitely, the net present value hypothesis would suggest that these prices increase at a decreasing rate. Utami and Ihalauw (1973 p. 50), for example, noted that the price for ten cropping seasons in Central Java in 1971 was less than twice the price of five cropping seasons. It might also be expected that as the duration of the lease tends to infinity the price approaches the purchase price, as shown in Figure 1. The exact form of this relationship, as implied above, will depend on such factors as the quantities of the various leases and the quantities of loanable funds in the market, and the term structure of interest rates. It might also be expected that discontinuities or 'humps' in the relationship could occur if the market had strong preferences for particular types of leases. For example, land ownership may have desirable properties, other than its monetary return, such as prestige value. The alternative view of the relationship between price and duration of lease is that there is a ceiling on the size of the loan which can be raised with a unit area. This ceiling is the sale value of land the price of which is the transfer of ownership (infinite-time) rights.

Variation in both land size and duration of lease

Thus far the argument has considered the duration of lease to be

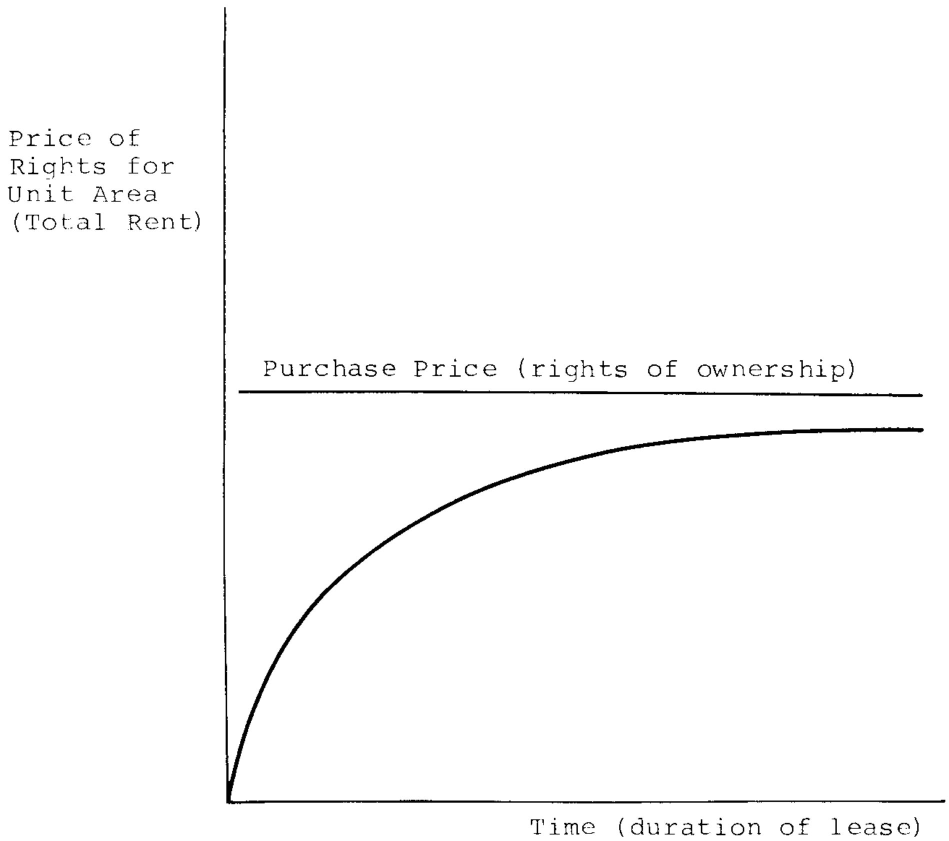

FIGURE 1 – Hypothesised Relationship between the Price of Lease Rights for a Unit Area and the Duration of the Lease.

assigned on a unit area of land. An additional decision faced by both land owners and tenants is the area of land to be leased under any given duration of lease. In this section the conventional analysis of this decision, in which the marginal revenue product of land is equated to the market rent, is left aside and attention is directed to some particular aspects involving the lending aspect of land leasing.

The most interesting aspect of this question is that the total rent (size of the loan) can be affected by both the area leased and the duration of the lease. That is, with the duration of the lease fixed, the total rent can be increased by increasing the area leased; conversely, with area fixed, the total rent can be increased by increasing the duration of the lease. With duration of lease fixed, total rent need not be linearly related to area leased. For example, economies or diseconomies of size, risk and risk preferences, liquidity preferences and any prestige effects associated with the area leased may produce a non-linear relationship.

Given that the size of a loan can be affected by area and duration of the lease, it follows that area leased and duration of lease can substitute one for the other when the parties negotiate a loan contract for a particular amount of money. This adds a new dimension to the usual arguments (such as security of tenure) for the choice of the duration of leases for those leasing markets which have credit functions. It suggests that, by simultaneously determining the area leased and the duration of lease, the participants are negotiating the terms of a given loan. This relationship is shown as a rent surface in Figure 2 and as a set of iso-rent curves in Figure 3. At any point in time it is to be expected that the market rate of substitution between area and duration of lease will be influenced by a set of variables including the market's expectations about the future net returns from land and expectations about future rents and interest rates.

Implied rates of interest in sewa contracts

It is difficult to obtain a precise measure of 'the' rates of interest when those rates are implicit in the borrowing/lending transactions which take place. The gross margin (gross return minus variable costs) from the rented land in each season constitutes unequal half-yearly repayments of principal and interest. When loan repayment is viewed in this way the implied rate of interest is the rate which equates the amount of the loan to the present value of this stream of repayments over the period of the loan. In other words, the implied rate of interest can be measured as the internal rate of return of the 'investment project' which has an initial capital equal to the value of the loan and which has cash flows equal to the sequence of seasonal gross margins from the rented area. The gross margin is a convenient measure of the seasonal net return from the

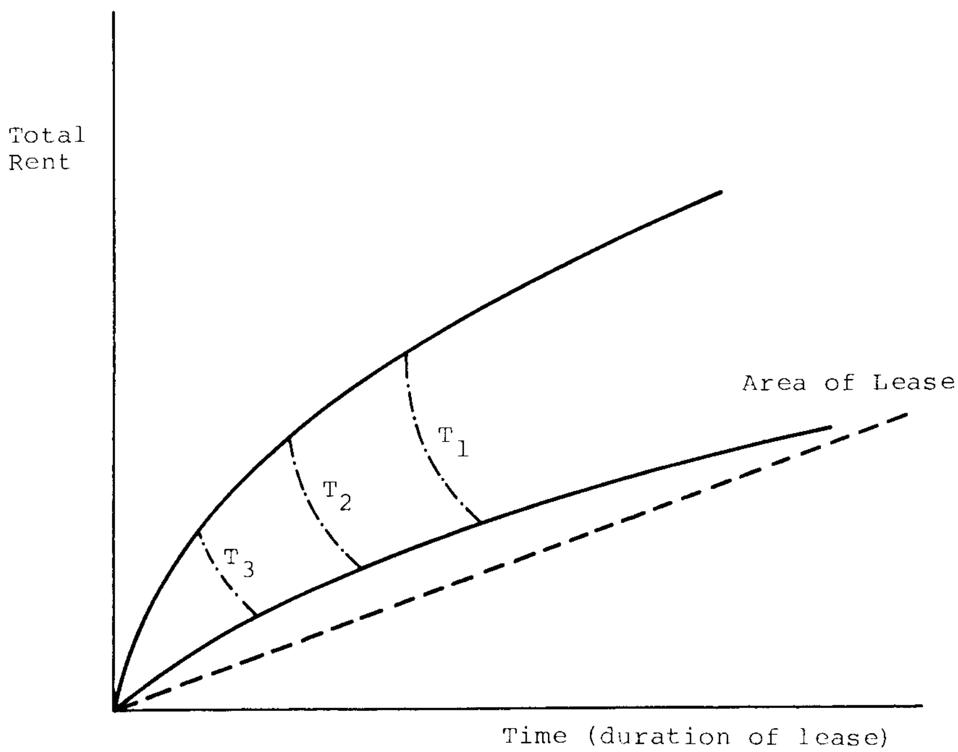

FIGURE 2—Hypothesised Relationship between Total Rent, Area of Lease and Duration of Lease.

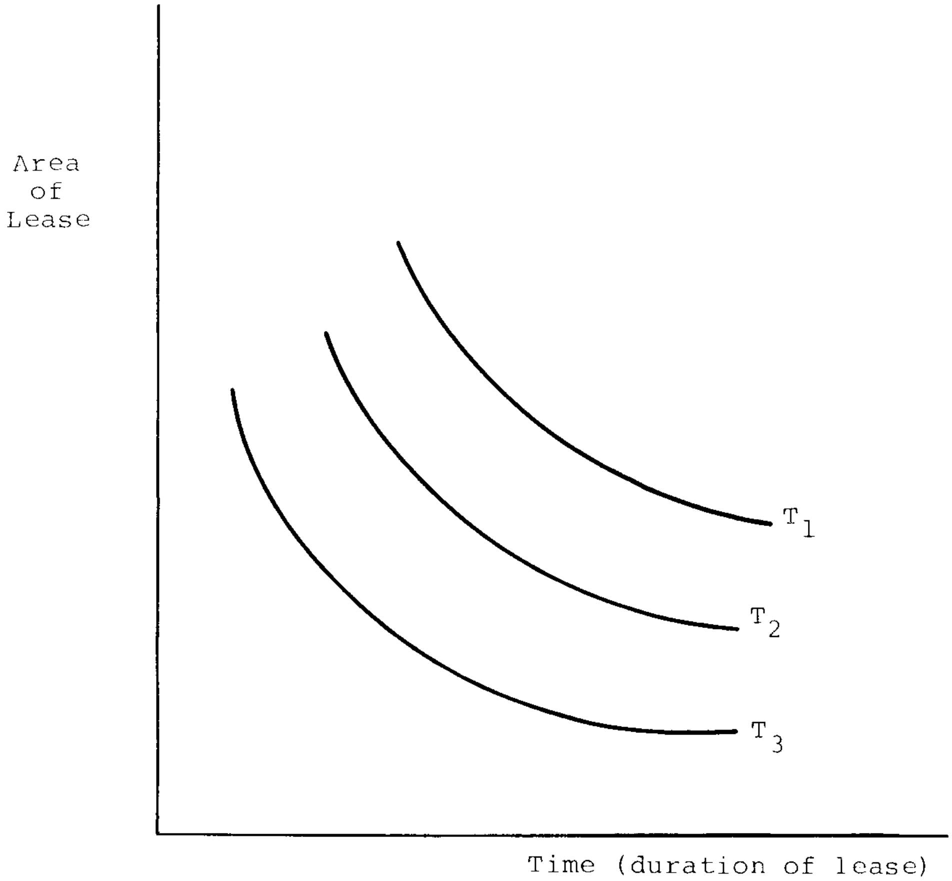

FIGURE 3 — Iso-Rent Curves.

rented land but because it does not include overhead costs the implied rates of interest are likely to be over-estimated. A further upward bias in the implied rates of interest results from the difficulty of valuing the extra labour required to work the rented land.

With these qualifications, the implied rates of interest embodied in a one-year loan (i_1), a two-year loan (i_2) and a three-year loan (i_3) for the same face-value of total rent (TR) can be determined from the following equations in which, for simplicity, the one-year loan (equation 1) involves one hectare. Each year is assumed to have two cropping seasons (wet season and dry season) of equal duration. Leases longer than three years will follow the same pattern.

$$(1)\quad TR = a_1/(1+i_1) + a_2/(1+i_1)^2$$

$$(2)\quad TR = a_1(1-x)/(1+i_2) + a_2(1-x)/(1+i_2)^2 + a_3(1-x)/(1+i_2)^3 + a_4(1-x)/(1+i_2)^4$$

$$(3)\quad TR = a_1(1-x-y)/(1+i_3) + a_2(1-x-y)/(1+i_3)^2 + a_3(1-x-y)/(1+i_3)^3 + a_4(1-x-y)/(1+i_3)^4 + a_5(1-x-y)/(1+i_3)^5 + a_6(1-x-y)/(1+i_3)^6$$

where a_j ($j = 1 \ldots 6$) are the seasonal gross margins per hectare, x is the reduction in area (the arc marginal rate of substitution of area for duration) between a one-year loan and a two-year loan, and y is the reduction in area (marginal rate of substitution) between a two-year loan and a three-year loan. More generally, the multipliers on the a_j could be replaced with a function describing the marginal rate of substitution between area and duration of leases (MRS_{AD}).

Two observations about the sensitivity of the implicit interest rates to the a_j can be made. Firstly, the interest rate for each duration of loan is subject to risk because the seasonal gross margins are risky. In fact it has been argued that price and yield risks are the major risks faced by lenders in this credit market (Wijaya and Sturgess 1979, pp. 91-2). It is expected that a one-year loan will be the most risky because of the few repayments and greater yield risk in the short term. Presumably, any premiums for risk and liquidity, which normally might be associated with interest rates, are incorporated into the lump-sum price of the lease in these transactions. For ease of exposition we will assume, for the time being, that the a_j are known with certainty.

The second observation is that the interest rates will depend on the relative sizes of the gross margins of the wet season and the dry season and which season occurs first in the sequence. Thus, if the gross margin in the wet season is higher than that of the dry season and the wet season is the first in the sequence of repayments, a higher rate of interest can be expected for a given length of loan than if the dry season is the first repayment. This effect is likely to be greatest for the short-term loans. We will assume that a_1 is the gross margin per hectare in the wet season; that a_2 is the gross margin per hectare in the dry season; that $a_1 = a_3 = a_5$; and that $a_2 = a_4 = a_6$.

Given these assumptions about risk and the sequence of seasonal repayments, equations (1), (2) and (3) can be written as:

(4) $TR = a_1 z_1/(1 + i_1) + a_2 z_1/(1 + i_1)^2$

(5) $TR = a_1 z_2/(1 + i_2) + a_2 z_2/(1 + i_2)^2 + a_1 z_2/(1 + i_2)^3 + a_2 z_2/(1 + i_2)^4$

(6) $TR = a_1 z_3/(1 + i_3) + a_2 z_3/(1 + i_3)^2 + a_1 z_3/(1 + i_3)^3 + a_2 z_3/(1 + i_3)^4 + a_1 z_3/(1 + i_3)^5 + a_2 z_3/(1 + i_3)^6$

where $z_1 = 1$, $z_2 = (1 - x)$ and $z_3 = (1 - x - y)$, that is, the z's are the amounts of land embodied in each loan for the given loan (TR).[4]

Using these equations, it can be shown that the term structure of interest rates, or the 'yield curve' of loans of different maturity dates (Goodhart 1975), and the marginal rate of substitution of area for duration of lease are intimately related. Given TR, a_1, a_2 and the i_1 which results from solving equation (4), values can be found for z_2 and z_3 such that $i_3 = i_2 = i_1$. We will designate these values as z^*_n. The general solution for this flat yield curve is:

(7) $$z^*_n = z^*_{n-1}(1 + i)^2\{1 - [(1 + i)^2]^{n-1}\}/\{1 - [(1 + i)^2]^n\}$$

From this solution the 'critical values' (that is, $i_1 = i_2 = i_3$) of $x(x^*)$ and $y(y^*)$ can be determined by subtraction. Also, it follows that if the actual

[4] Note that z_1, in theory, will be determined by the marginal rate of substitution between some shorter loan (say, 6 months) and a one-year loan. We have taken $z_1 = 1$ as a convenient starting point.

value of z_n is greater than z^*_n the yield curve will be ascending between adjacent durations of loan, and that the yield curve will be descending if the actual value of z_n is less than z^*_n. Table 1 sets out the possible term structures and the conditions which would produce them for the three durations of loan being considered.

If the proposition that the leasing/lending arrangements are but a small component of a village's financial market is accepted, then it has been shown that users of this type of instrument can respond to the existing term structure, or changes in that structure, by altering the area of land for different durations of lease, that is, by adjusting MRS_{AD}. In turn, this implies that the relationship between total rent, area leased and duration of lease will change as interest rates are adjusted, all other things being equal. On the other hand, if the range of credit arrangements for particular purposes (say, consumption purposes) were restricted, there may be a greater degree of simultaneity between the determination of the term structure of interest rates and the way total rent responds to area and duration of lease.

An Application of the Model

Twenty-two cases of cash renting contracts (*sewa*) were observed amongst the farmers on a reasonably homogeneous block of irrigated land in the village of T about six kilometres from the city of Malang in East Java. These data are shown in Appendix 1 and a detailed description of the farms and the village can be found in Wijaya (1981). These observations permit an estimate of the relationship between total rent, area leased, and duration of lease for that type of contract in that area. From the fitted function, an estimate of MRS_{AD} can be obtained for any given amount of total rent. For the purposes of estimation, observations 17, 18 and 19 were deleted because it was known that these arrangements involved payments for other services as well as the rights to land. Although total rent was adjusted to 1977 rupiah using the Malang cost-of-living index, the estimated relationship is likely to be a hybrid. Firstly, the contracts were made in different years and, therefore, they are likely to have involved different expectations about the future earning power of the rights to land. Secondly, the specific parcels of land involved were not necessarily homogeneous even though they were very close together. In addition, even though the village is close to Malang, a cost-of-living index for a city may not be an ideal indicator of purchasing power in a village.

TABLE 1

The Conditions (Amounts of Land) Producing Possible Term Structures of Interest Rates for a Given Loan

Term structure	Yield curve	Conditions
$i_1 = i_2 = i_3$	Flat	$z_1 = 1,\ z_2 = z^*_2,\ z_3 = z^*_3$
$i_1 < i_2 < i_3$	Ascending	$z_1 = 1,\ z_2 > z^*_2,\ z_3 > z_2\ (z^*_3/z^*_2)$
$i_1 > i_2 > i_3$	Descending	$z_1 = 1,\ z_2 < z^*_2,\ z_3 < z_2\ (z^*_3/z^*_2)$
$i_1 < i_2 > i_3$	Humped	$z_1 = 1,\ z_2 > z^*_2,\ z_3 < z_2\ (z^*_3/z^*_2)$

The estimated relationship between total rent, area and duration of lease

Two forms of the estimating equation were fitted to the data, a power function and a linear function. For the reasons outlined earlier the non-linear relation is to be preferred. In addition, a linear form gives a constant MRS_{AD} along an iso-rent line which, in turn, means a rent can be obtained when either area or duration of lease is zero. For these reasons the results using only the power function are reported. (See Wijaya 1981 for results using the linear function.)

The estimated function was:

$$\text{(8)} \qquad \text{Total Rent} = 81\ 208 \underset{(0.001)}{} A^{\underset{(0.001)}{0.7124}} D^{\underset{(0.001)}{1.2895}}$$

$$\bar{R}^2 = 0.76$$

where the figures in parentheses are the levels of significance of the coefficients.

A third variable which may affect the amount of total rent which can be commanded by a given area and duration of lease is the duration of the waiting period between the time of payment and the time the tenant/lender is able to begin working the lease. Including this variable (measured in months) in the estimated equation had little effect on the size of the other coefficients or on the adjusted R^2. As might be expected, the sign of the coefficient was negative but it was not significant. Therefore, the variable representing the length of the waiting period was omitted from the total rent equation.

The magnitudes of the coefficients suggest that total rent is relatively more responsive to a unit change in the duration of the lease than to a unit change in the area leased; in fact, total rent exhibits 'increasing returns' to duration of lease. This is indicated further in Table 2 where the mean rent per hectare is compared for each duration of lease.

TABLE 2

Mean Rent per Hectare for the Three Durations of Lease

Duration of lease	Mean rent
years	Rp
1	115 013
2	326 599
3	746 519

This is in marked contrast to the observations of Utami and Ihalauw (1973) referred to earlier. In terms of the model, this difference between our observations near Malang in 1977 and Utami and Ihalauw's observations in Klaten (Central Java) in 1971 could be indicative of a different term structure of interest rates across space and/or time.

The iso-rent contours of equation (8) have the form:

$$\text{(9)} \qquad A = [TR/81\ 208 D^{1.2895}]^{1/0.7124}$$

The MRS_{AD} or the slope of the iso-rent contours, is given by the ratio of the partial derivative of equation (8) with respect to duration to the partial derivative with respect to area. This ratio reduces to:

(10) $$MRS_{AD} = -1.8101A/D$$

Selected points on the iso-rent contour for Rp 81 208 are shown in Table 3 along with the point MRS_{AD} and the arc MRS_{AD} for the three lengths of lease. A total rent of Rp 81 208 was selected because it is the predicted rent for unit values of both area and length. In terms of equation (7), $z_1 = 1$, $z_2 = 0.29$, $z_3 = 0.14$ and by subtraction, $x = -0.71$ and $y = -0.15$.

In summary, equation (8) provides support for the hypothesis that area of lease and duration of the lease can substitute one for the other in raising a specified amount of cash. This support, however, must be tempered by the small sample ($n = 19$) from which the coefficients of equation (8) were estimated. Complicating influences are likely to include the length of the waiting period, the condition of the land, the urgency of the borrower's need for cash as well as the ability of retained land to meet his consumption needs, and the opportunity return on the lender's funds.

The estimated term structure of implied interest rates

To estimate the implied real rates of interest the three combinations of area and duration of Table 3 were used as three different terms of raising a loan of the same face value (Rp 81 208). Longer time periods and larger areas were not considered as these would have involved extrapolation beyond the ranges of the data used to estimate equation (8).

TABLE 3

MRS_{AD} for Three Durations of Lease (TR = Rp 81 208)

Loan	Area	Duration	Point MRS_{AD}	Arc MRS_{AD}
	ha	years	ha/year	ha/year
1	1.00	1	−1.81	—
2	0.29	2	−0.26	−0.71
3	0.14	3	−0.08	−0.15

As implied earlier, the trade-off between area and duration of lease, and the anticipated rates of return, are likely to depend upon the borrowers' and lenders' anticipated gross margins over the period of the agreement. An indication of the uncertainty in the realised internal rates of return arising from yield uncertainty was obtained by simulating each loan over 1000 transactions. For each simulation it was assumed that rice was grown in both the wet and the dry seasons (common practice in village T); that the prices of rice remained constant at the 1976-77 values (Rp 6816/quintal for the wet season and Rp 6619/quintal for the dry season); and that the variable cash costs per hectare remained constant at the values estimated from the survey for 1976-77 (Rp 95 222 for the wet season and Rp 110 130 for the dry season). The yield per hectare was assumed to be a random variable distributed according to the 'consensus' distribution for rice yields in village T (Appendix 2). Furthermore, it was assumed that the yield distribution was the same for each season and that the distribution of yields was independent of the area of leased land. Therefore, for each season in each simulation of a given loan the gross margin was calculated according to the formula:

$$\text{Gross margin} = [\text{Price/quintal} \times \text{Random yield (quintal/ha)} \times \text{Area (ha)}] - [\text{Variable cash costs (Rp/ha)} \times \text{Area (ha)}]$$

For a given yield in both seasons the wet season gross margin will be higher than the dry season gross margin, due to the higher price and lower costs.[5] Therefore, the internal rate of return for a given loan could be higher if the first repayment occurs at the end of the wet season. This effect is greatest for the one-year loan and least for the three-year loan. For example, assuming the mean yield (32.85 quintals/ha) was achieved in each season, the differences in the annual internal rates of return between a wet season and a dry season as the first repayment were 21.2 per cent for loan 1, 2.0 per cent for loan 2, and 0.4 per cent for loan 3. For the simulation of each loan with random yields, the first repayment was assumed to occur at the end of the wet season. The mean annual internal rates of return and measures of dispersion, estimated over 1000 runs of each loan, are shown in Table 4.

Given the estimated rates of substitution between area and duration of lease (and constant expectations of prices and costs) the most interesting result shown in Table 4 is that mean interest rate on the given loan declines markedly with the length of the loan. This result is confirmed by the raw data without estimating the marginal rate of substitution of area for duration of lease. Using the data of Table 2, with the area of land at one hectare and average yields in each season, the implied interest rates for each length of loan were 135.1 per cent for a one-year loan; 33.8 per cent for a two-year loan; and −3.0 per cent for a three-year loan.

Table 4 also shows that the riskiness of the loan, as measured by the standard deviation of the internal rate of return, decreases with the duration of the loan, but that the relative dispersion, as measured by the coefficient of variation, increases with the duration of the loan. In 68 cases in every 100 examples of each loan, the internal rate of return would be positive, but negative internal rates of return would be encountered within the range of the mean plus or minus two standard deviations for all loans.

A negative internal rate of return means that the lender would not obtain repayment of his principal and the figures suggest that this is

TABLE 4

The Annual Internal Rates of Return for a Loan of Rp 81 208 on Various Terms

Loan	Area	Duration	Internal rate of return: Mean	Internal rate of return: Standard deviation	Coefficient of variation	Mean plus or minus one standard deviation
	ha	years	per cent			per cent
1	1.00	1	254.3	136.1	0.53	118.2 to 390.4
2	0.29	2	50.0	32.1	0.64	17.9 to 82.1
3	0.14	3	12.6	11.1	0.88	1.5 to 23.7

[5] For example, if the mean yield 32.85 quintals/ha were achieved in each season, the gross margin per hectare would be Rp 128 684 for the wet season and Rp 107 304 for the dry season.

relatively more likely with the three-year loan than the other two lengths of loan. This effect is due to the small area of land involved in loan 3; even if the mean yield were achieved in each season, the total gross margin earned over the three years would be only Rp 96 921 (or 10.8 per cent). On the other hand, the chance of a very low interest rate is greater with the short-term loan since there are only two repayments; that is, the limit of the range mean rate minus two standard deviations is −17.9 per cent for loan 1, and −10.1 for loan 3. For example, a zero gross margin as the first repayment and average gross margins for the remainder of the sequence gives a return of 30.0 per cent for loan 1 and −1.2 per cent for loan 3. A crop failure, with variable costs still incurred, as the first in the sequence (with average gross margins for the remainder) gives a return of −60.0 per cent for loan 1 and −8.6 per cent for loan 3.

Conversely, a unique feature of these loans, apart from their flexibility, versatility and asset preservation, is the opportunity for the lender to enjoy favourable deviations from expected outcomes ('up-side' risk). Some indication of the magnitude of this effect is shown also in Table 4.

This simple analysis has shown that the implied rate of interest and its risk depend on the size of the loan and its repayment terms. The latter depends on the rate of substitution between area and duration of lease. We conclude that the observed MRS_{AD} is consistent with a declining term structure of interest rates in this rural credit market. This conclusion is in line with the observation that the rate of return on purchasing land appears low. For example, a plot of 0.4 ha of irrigated land on the sampled block in village T was sold in 1979 for Rp 2 m. Using the average of the wet season and dry season gross margins, at the average yield (Rp 117 994/ha) this would imply an annual rate of return of about 2.3 per cent. Our conclusion that the rate of interest declines with the length of the loan in informal credit markets is supported by Partadireja's (1974) analysis of *ijon*. The *ijon* loans (shorter term than *sewa*) involved annual interest costs from 102 per cent to 720 per cent. However, this comparison is inconclusive because of the small number of cases (seven) in Partadireja's analysis. All of those *ijon* loans were evaluated *ex post* and all produced a positive return to the lender, that is, no unsuccessful loans (low yields or prices) were included. In addition, Penny (David Penny, personal communication, 1978) observed short-term rates as high as 15 per cent per day for loans from money-lenders of three to four weeks (5475 per cent on an annual basis).

Implications and Conclusions

It has been argued that cash leasing of land, or its produce, has a dual interpretation when all the rent is paid as a lump sum in advance. The evidence from our survey suggests that farmers in this area, and possibly elsewhere, regard leasing contracts as having a credit function and that the loans raised by this means were used for purposes for which there were few other debt instruments.

We have presented a very simple model of this credit market in which the set of rights to land which is assigned to the lender is the 'price' of the loan. Only when the lender (tenant) exercises these rights to work the land does he obtain repayment of his principal and earn interest. In this respect repayments to the lender are dependent on his managerial ability, the quality of the land and the vagaries of weather and prices. Thus land (and crop) leasing must be added to the list of informal mechanisms by which farmers and other businessmen in Indonesia may obtain finance. In relation to these sorts of debt instruments McLeod (1980) stated:

> . . . the reason why . . . writers jump so readily to the conclusion that finance markets are imperfect is that they have not come to terms with the heterogeneity of finance and the consequent diversity of financial markets . . . the product 'finance' is not at all a homogeneous product. Rather, it differs according to such things as the time schedule, nature and flexibility of repayments, the form of security used, the existence or lack of legal documentation, the time taken to bring a loan to fruition, the amount of disclosure of information required, the place where negotiations are undertaken, the degree to which the loan is tied to a particular kind of expenditure, the procedures which might be followed in case of default, the business acumen and credit-worthiness of the borrower and so on. It is this heterogeneity which is largely responsible for the sometimes dramatic differences in the price of the 'product'—that is, the interest rate (pp. 16-17).

The rate of interest for *sewa* loans is an implied rate which can be measured as the internal rate of return that equates the principal of the loan with the stream of gross margins earned from the land. The dual interpretation of *sewa* contracts means that these transactions form a connection between two intricately related markets—the market for land and the market for financial capital. Thus, paraphrasing Boulding (1944), the rate of interest to be expected from a lease is determined at any moment by the price of that lease. The higher the price of the lease, the lower the rate of interest assuming that future returns to the owner of the lease do not change. In this sense it is not the rate of interest which is determined in the market but the price of leases and the rate of interest is:

> . . . merely a certain mathematical property of a series of expected payments and their present price. The price of securities is not determined by the rate of interest; the expected rate of interest (and all rates of interest are expected) is determined by the security's present price (Boulding 1944, p. 326).

In terms of Boulding's liquidity preference theory of market prices, and as implied earlier, the price of any lease will be determined by the quantity of money in the market, the quantity of the lease in the market, the liquidity preference ratio and the preference ratio for that lease the last being defined as the proportion of total resources which the market wishes to hold in the form of a particular type of lease. To the extent that the market has stronger preferences for rights to land in the form of longer leases (or ownership) than shorter leases, the price of such rights will be high and the rate of return correspondingly low. For example, it is possible that the non-monetary benefits which accrue to the possession of longer term rights to land may influence the market's preference for those rights and, therefore, their price. Such benefits might include the prestige value of ownership and long-term leases, a greater assurance of meeting subsidiary requirements for food, and the greater options for saleability (sub-leasing) which stem from longer term leases.

The model of *sewa* contracts has demonstrated that a key attribute by which the interrelated markets are linked is the marginal rate of substitution between area leased and the duration of the lease in raising a loan of given size. This rate is determined by the way total rent responds to area leased and duration of lease. Most importantly it has been shown that any term structure of interest rates can be obtained by altering this marginal rate of substitution. In other words, the marginal rate of substitution of area for duration of lease is an economic mechanism through which expected implicit interest rates can be expressed.

Applying the model to a set of observed *sewa* contracts negotiated within a fairly short span of years revealed a marginal rate of substitution that gave rise to a declining term structure of implied interest rates. This term structure is indicative of stronger preferences, and therefore higher prices, for longer term securities. Some scant evidence from the interest rates associated with other shorter and longer term securities seemed to support this contention. On the other hand, our analysis was based on *sewa* contracts up to only three years' duration. Given the observed marginal rate of substitution there may be good reason for this; namely, the amount of land for a given loan on terms longer than three years becomes very small and the repayment risks relatively higher or the market may be segmented at about this length of terms, with the possibility of a hump in the yield curve. We happened not to observe any of these longer leases in our sample in this village.[6] The aforementioned observation of Utami and Ihalauw (1973) suggests that longer leases are not uncommon in some areas and that those areas (or villages) may have different term structures of implied interest rates, and hence a different marginal rate of substitution from that found in village T.

It must be noted that this important function of *sewa* contracts was 'discovered' during the course of a larger study (Wijaya 1981); therefore, it was not possible to pursue important hypotheses stemming from our model and our findings. The degree of generality of the model to other parts of Java, the relationships between *sewa* markets and other credit markets, variations in substitution rates, and the more complex issues surrounding the negotiation of the terms of these loans are matters which require investigation. For example, the model leads to the hypothesis that areas of land with different productivity in the same credit market (say, the same village) will exhibit the same term structure of implied interest rates when that land is leased, but the leases on each class of land will exhibit different rates of substitution of area for duration of lease. However, it is likely that an ever-present problem will be to observe the term structure in these fragmented credit markets. Similarly, more refined testing of the model may require the measurement of, or proxies for, participants' expectations about the future; that is difficult enough in more sophisticated credit markets with explicit interest rates and a large set of debt instruments.

Finally, we consider some of the implications for policy which arise from the model. The Basic Agrarian Law (Law No. 5, 1960), if fully implemented, would abolish *sewa* contracts or, at least, drive them 'underground'.[7] The history of the enactment of this law (Mortimer

[6] See the earlier comment on observations 17, 18 and 19 of Appendix 1.

[7] The Law of Production Sharing Agreements (Law No. 2, 1960) would, if implemented, abolish *ijon* contracts. As argued elsewhere (Wijaya and Sturgess 1979) *ijon* is similar in principle to *sewa*. Partly as a result of the enactment of that law, many *ijon* contracts seem to be conducted in secret.

1972; Wijaya 1981) reveals that part of its origin lay in the belief that land owners always are capable of 'exploiting' tenants. Our model of *sewa* and the finding that in the village of T many tenant/lenders were themselves land owners of roughly equal status and wealth to their landlord/borrowers (Wijaya and Sturgess 1979) suggest that tenant/lenders may have bargaining strength which has been overlooked. Indeed, for *ijon* contracts it is the lenders' bargaining strength which is said to lead to 'exploitation' of borrowers. At the heart of the matter it is possible that the 'repression' of explicit interest rates is a fundamental cause of the opportunity for exploitation wherever it lies. Without explicit interest rates it seems unlikely that a diversity of securities and debt instruments can develop which give the opportunity for competitive choice for both borrowers and lenders. Such a cultural and religious change may be a long time coming in the rural communities of Java in which Islam is the predominant religion. It remains important, therefore, that the range of choice in debt instruments not be restricted further by abolishing *sewa* without further study of this unusual credit market.

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APPENDIX 1

Cash leases on the block of irrigated land in village T

Observation	Area	Duration of lease	Waiting period	Year of commencement	Total rent
	ha	years	months		1977 Rp
1	0.680	3	2	1977	325 000
2	1.000	3	2	1975	405 000
3	0.300	2	0	1976	112 000
4	0.300	2	2	1976	112 000
5	0.250	2	3	1975	202 500
6	0.400	1	12	1976	25 760
7	0.400	1	4	1977	40 000
8	0.125	3	2	1977	56 000
9	0.100	2	0	1977	26 000
10	0.200	3	4	1976	168 000
11	0.273	2	24	1975	60 750
12	0.273	3	18	1975	141 750
13	1.000	3	2	1975	202 500
14	0.650	3	1	1974	331 800
15	0.500	2	2	1976	56 000
16	1.000	2	3	1975	135 000
17	1.100	5	0	1973	2 090 000
18	0.900	5	0	1973	1 828 750
19	0.680	6	0	1974	1 185 000
20	0.070	1	5	1976	10 080
21	0.225	1	0	1977	30 000
22	0.225	1	0	1977	30 000
Mean	0.484	2.6	4.0	–	344 268

APPENDIX 2

The sampled farmers, both owners and tenants, on the block of irrigated land in village T were asked to provide their subjective probability distributions for rice yields. It was found that most farmers were unable to provide such distributions when questioned using the visual impact procedure (Anderson, Dillon and Hardaker 1977, p. 22). Therefore, farmers were asked to state their anticipated maximum and minimum yields and their modal yield. The resultant triangular distributions were averaged (with each farmer's responses given equal weight) and converted to a cumulative distribution. The average values were:

maximum yield 53.52 quintals/ha
modal yield 40.46 quintals/ha
minimum yield 4.57 quintals/ha.

The cumulative distribution, which was regarded as the 'consensus' view of 'experts', is shown in Figure 4 (Anderson, Dillon and Hardaker 1977, pp. 135-6). The mean yield derived from this distribution was 32.85 quintals/ha.

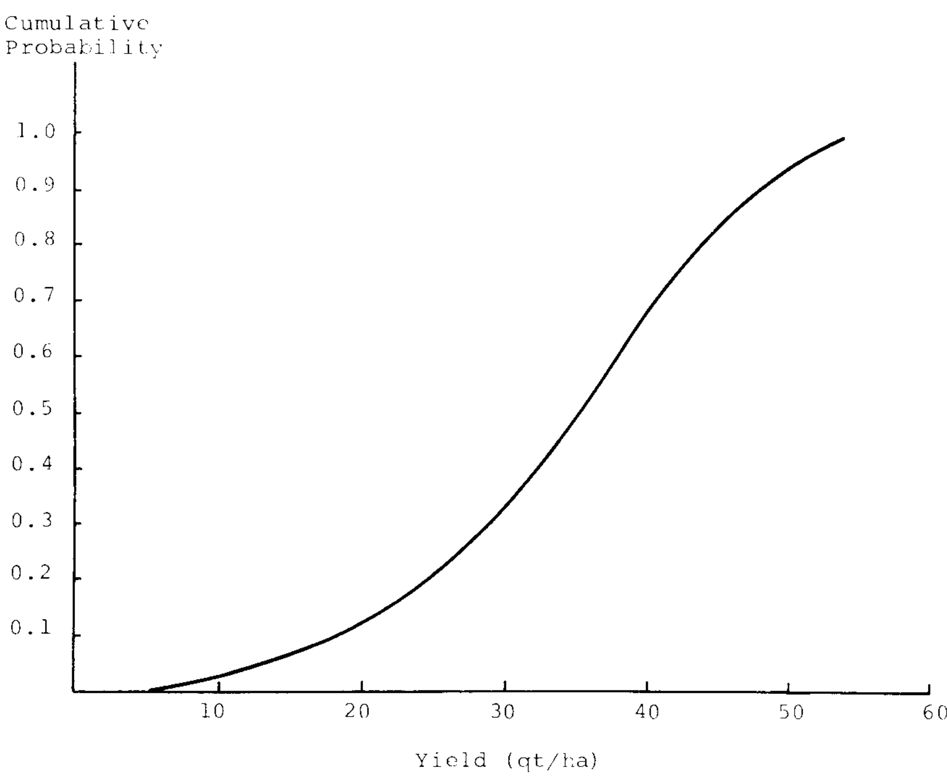

FIGURE 4—Cumulative Distribution Function for Yields of Irrigated Rice in Village T.