INTERLINKED CREDIT AND TENANCY ARRANGEMENTS: A STATE-OF-THE-ART REVIEW

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INTERLINKED CREDIT AND TENANCY ARRANGEMENTS: A STATE-OF-THE-ART REVIEW*

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I. INTRODUCTION

During the past decade, financial policy in the Philippines has been pushed in the general direction of liberalization. The package of reforms included lifting restrictions on deposit and lending rates, lowering reserve requirements on deposit institutions, liberalizing branching regulations, and removing the segmentation of the financial markets by blurring the specialization of financial institutions that have arisen from banking regulations. The thrust of financial reform reflected the prevailing view that the efficiency of financial markets in the less developed countries (LDCs) was hampered by regulations of the type enumerated above as well as the uncertainty generated by a macroeconomic environment conducive to large public deficits and high inflation (McKinnon 1973). The macroeconomic regime and the financial sector regulations all contribute to make the acquisition of financial instruments less than attractive for economic agents. This argument that financial repression lies at the root of the inefficiency of LDC financial markets leads to the conclusion that a reversal of the policy regime will provide incentives for acquiring financial instruments. This increases the amount of savings as well as the efficiency of the allocation of loanable funds across various investment opportunities.

At the same time, however, the agrarian economy in LDCs tend to be highly fragmented because of uncertainty and information asymmetries. Peasant agriculture is characterized by high risk, seasonability, sequential production phases, covariate yields and spatial dispersion (Binswanger and Rosenzweig 1986) limiting the applicability of the neoclassical paradigm of perfect and complete markets. Instead of anonymous agents transacting in frictionless markets, the identity and bargaining power of each agent become crucial in determining gains from bilateral transactions. Information asymmetries put a premium on close monitoring and personal ties to avoid adverse-selection effects and minimize the problem of moral hazard. Prices in such a world do not convey all the necessary information. Hence, even in the absence of myopic and ill-designed regulations on LDC financial markets as well as a stable macroeconomic environment, the risk of agricultural production and cost of information alone tend to hinder the efficient functioning of capital markets. Unless these real factors are appreciably changed, then financial markets in LDCs will continue to be characterized by fragmentation and second-best efficiency.

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In the Philippines, trade and exchange rate policies of the national government have also been biased against agricultural production and the export of agricultural products (Bautista, Power *et al.* 1979; Bautista 1987). In responding to political pressure from urban consumers, government has traditionally opted to underprice agricultural commodities and further distort incentives to farm production. These measures tax agricultural production. But less noted is the fact that these measures tend to reduce the flow of savings and investment in the rural sector and inhibit the growth of the rural financial system. This is because the demand for credit is a derived demand and rural saving is a function of agricultural incomes. Hence, policies that limit the growth of agricultural production and income also adversely affect the growth of the rural financial sector.

Table 1 shows the pattern of lending by the formal financial sector to agriculture over the past decade. If financial liberalization were presumed to be the panacea, then the potion certainly did not seem to have led to a rejuvenation. In fact, the ratio of formal sector lending to agricultural gross value added (GVA) declined over time.[1]

Factors hindering the development of an efficient rural financial sector may be grouped under four main categories -- (i) regulations that serve as barriers to competition among financial institutions, (ii) an unstable macroeconomic environment characterized by high and variable inflation rates, (iii) trade and exchange rate policies that bias incentives against agriculture and (iv) high risk of agricultural production and information asymmetries that characterize agrarian economies. Policy should then be pushed in a direction that alleviate the problems generated by these factors. The thrust of financial liberalization is to address factors (i) and (ii). Trade liberalization and the setting of a "realistic" exchange rate should help correct factor (iii). Investment in social and physical infrastructure and possibly land reform will lessen the burden posed by (iv).

The foregoing analysis suggests that first-best policies require less government intrusion in financial markets, getting prices right and the provision of public goods. To a large extent, this reflects the view that the government as an economic actor, should specialize in precisely those activities it enjoys comparative advantage, i.e. production and provision of public goods. Note that the provision of public goods means much more than the building of roads or bridges. To the extent that a peaceful, orderly and equitable society is a public good, then the role of government extends beyond satisfying the needs of economic man.[2]

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1. This proposition is too dismissing of the potency of policies that attempt to end financial repression. In the first place, although financial liberalization has been a major thrust of the public sector in the last decade, this was not accompanied by a stabilization of the macroeconomic environment. Indeed, the 1980s were punctuated by severe international and domestic shocks to the macroeconomy. It saw the worst balance- of-payments crisis and recession in Philippine post-war history.

The downward trend in the ratio of the lending to agricultural GVA may reflect the winding down of many subsidized lending policies initiated by government and channeled through the formal banking sector. In this case, although the magnitude of financial flows has declined one can argue the allocation of any given amount of lending will have improved due to financial liberalization.

2. The idea that a more equitable distribution of income represents a public good arises if it is assumed economic agents are altruistic (Hochman and Rogers 1969), i.e., utility is a function of own and other's incomes.

Table 1
RATIO OF LOANS GRANTED TO GROSS VALUE ADDED IN AGRICULTURE, 1980-1989
(In percent)

Year	Crops	Livestock	Fishery	Forestry
1980	42.7	37.6	9.0	23.8
1981	44.1	38.5	11.9	34.3
1982	38.9	39.6	12.3	32.2
1983	39.7	34.3	14.2	25.6
1984	22.7	18.7	7.2	16.0
1985	18.3	9.7	4.7	16.9
1986	21.5	9.5	7.7	11.0
1987	22.3	8.6	7.4	12.8
1988	18.4	10.9	12.5	12.8
1989	16.0	11.6	9.5	12.2

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The declining role of the formal financial system in the provision of credit to Philippine agriculture is of major concern to policymakers, given the strategic role of agriculture. The agricultural sector is the employer of nearly half of the labor force[3] and provider of income for nearly two-thirds of the population (Department of Agriculture. 1990). In the past, the government response to this imbalance in financing coming from the formal sector was subsidized credit. The massive failure of rural banks and the high default rates encountered in the supervised credit programs suggest the inefficiency and the unsustainability of these types of policy. Only a very small proportion of small farmers was reached by these programs and they failed to sustain credit support on a long-term basis (Technical Board for Agricultural Credit. 1985). At the same time, a significant part of the subsidy implicit in these programs was captured by big rather than small farmers (Esguerra 1981).

On the other hand, most small-scale farmers continued to obtain their financing from informal credit sources. In the absence of detailed information about the informal market, there is a wide range in the estimates of its size varying from a low 37 percent (Sacay *et al.* 1985) to a high 90 percent (Agricultural Credit Policy Council 1990) of total agricultural lending. Still these estimates suggest the informal sector has been a flexible and significant source of funding for many agricultural enterprises, specially small ones.

In light of these policy failures and apparent unwillingness of the formal financial system to increase the flow of credit to rural enterprises despite the significant liberalization of the financial environment, there is increasing interest in the informal financial sector. The issues range from assessing the efficiency of this sector to seeing how it interacts with the formal financial system and other institutions of the agrarian economy (the labor and land markets). How are problems of risk, moral hazard and adverse selection handled by borrowers and lenders? What is the structure of interest rates charged in these informal arrangements? Do they vary considerably and do they reflect the high cost of information and high risk premiums or are they monopoly rents?

One of the more fascinating aspects of financial relations in the rural economy is the prevalent interlinked transactions involving credit and labor arrangements, land use or marketing services. This practice of interlinking is found in large areas of South Asia. Its prevalence is observed in rural credit markets in the Philippines (Bautista and Magno 1990). There are indications interlinking is practiced widely in the urban sector. Many small enterprises in the urban areas have credit needs served not by large banks but agents who market their output or input suppliers.

Interlinking has been explained largely as a response to imperfections in the agrarian economy. These imperfections are caused by the existence of risk and information asymmetry. In this context, these contracts produce a gain in economic efficiency. The question of how this institution will survive a major land reform program that will cover a wide array of crops (sugar and coconut, being the more prominent ones) is important, given the promise (or threat) of agrarian reform in this country. There are no studies, historical or empirical, of the evolution of these types of contracts in countries that have undergone successful land reform programs. It is significant to explore the welfare implications of an

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3. Employment in fishery and forestry is included.

institutional shock like land reform in a setting where risk and information asymmetries are important and institutions (interlinked contracts) exist that attempt to reduce these types of frictions.

The theoretical literature on interlinked credit contracts has been focused on tenancy cum credit contracts. Very few have dealt on other types of interlinked contracts, for example, marketing *cum* credit or land *cum* credit interlinking.[4] This gap in the literature may prove important, given the historical experience of the rice sector subjected to land reform in this country. Both the green revolution and land reform shifted the source of informal credit from landowners to rice traders. Credit continues as part of an interlinked arrangement involving at the same time the conferment of marketing rights to the trader-creditor.

This review attempts to provide the background for a more detailed and rigorous examination, both theoretical and empirical, of the issue of agrarian reform and interlinking. In a sense, this issue can be interpreted as part of the larger question of institutional change in an agrarian setting. The peculiar environment of the agrarian economy produces a set of relationships and institutions. A subset of these institutions then will represent means of coping with certain forms of market imperfections. The process of economic development, whether engineered by the state or the private sector, will entail a fundamental alteration of this environment and the unraveling of some, if not most, of these institutions. The program of agrarian reform represents an important innovation that will alter the landscape of the rural sector. An understanding of this processs is necessary in order to reduce the costs of transition and adjustment. And it is in this light that the study on interlinked contracts should be seen.

This review contains five sections. The first section provides a capsule summary of the share tenancy literature while the second describes leading explanations of market interlinking. Section III looks at interlinking of marketing and credit services while section IV deals with land market and credit interlocking. The last section discusses some of the welfare implications of various policy interventions, ranging from banning interlinked contracts to agrarian reform.

II. AN ANALYSIS OF SHARE TENANCY

Much of the theoretical literature on interlinked credit arrangements has been framed in terms of the relationship between landlord and tenant. This makes it difficult to provide a satisfactory survey of the field without delving into the literature on share-tenancy. Hence, this chapter starts by presenting some of the basic issues in this area. For a recent and comprehensive survey of the field, the reader is referred to Otsuka and Hayami (1988) and Hayami and Otsuka (1991).

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4. The major exceptions are Floro (1987), Geron(1989) and Floro and Yotopoulos(1991).

The standard argument against share tenancy centers on the weakening of work incentives that arises since the tenant receives only a share of the marginal product of his effort. This analysis dates back to Alfred Marshall (1890) and can be formally stated in the following way. Let U (e,c) be the utility function of the tenant where e is the level of work effort and c is the consumption of the tenant. Assume his consumption level is just his share of the output c $=\alpha$f(e), where f(e) is the production function and α the tenant's share of the harvest. Maximizing U (e,c) with respect to effort leads to the first-order condition:

$$(1.1) \qquad - U_e/U_c = \alpha f'(e)$$

Here, U_e is the marginal utility of effort, U_c the marginal utility of consumption and f'(e) is the marginal product of the tenant's effort. Hence, the tenant sets the marginal rate of substitution between effort and consumption equal to a share of his marginal product. Given that $U_{ee} < 0$, this means the effort exerted by the tenant is lower than in a situation where $\alpha = 1$.

Cheung (1969) considers the case where the optimal level of work effort can be enforced by the landlord (Figure 1). The level of effort is measured along the horizontal axis and output and consumption along the vertical axis. The curve f(e) is the production function while U* is the indifference curve that assures the tenant his reservation utility level. The curve αf(e), on the other hand, is the share of output that goes to the tenant. The pareto-efficient allocation of effort is given by e*. This occurs at the level of effort where the vertical distance between the production function and the indifference curve U* is maximum. An alternative characterization of the first-best allocation is that the tenant's marginal rate of substitution between effort and consumption be equal to the marginal product of effort. In other words, e* is the solution to equation (1) when $\alpha = 1$. If the level of effort cannot be enforced, then the tenant will shirk and supply only the level of effort $e_\wedge$. This is where his indifference curve is tangent to his opportunity curve. However, assuming the effort level e* can be enforced by the landlord, then the share contract will achieve the same level of resource efficiency. Note at e*, the tenant's indifference curve is not tangent to his opportunity curve (αf(e)). Hence he will like to shirk and offer less effort. However, assuming perfect enforcement of work effort, this is not possible for him. But Cheung's assumption and analysis also mean that a fixed-wage and a fixed rent contract will yield the same first-best outcome and other considerations have to be provided to explain why share tenancy is chosen relative to other types of contracts. In Figure 1, for instance, the fixed-wage contract is given by the horizontal line WW which cuts U* at the same effort level e*. The fixed-rent contract is given by the curve f(e)-ß, where ß is the fixed amount of rent turned over to the landlord. Again, if effort can be enforced, then it achieves the same resource allocation as the share or fixed-wage contracts.

Cheung suggests that in the presence of uncertainty share tenancy allows a sharing of risk between landlord and tenant and provides an added dimension to the choice between share, fixed-wage or fixed-rent contracts. He assumes a higher transaction cost for negotiating a share contract than for either a fixed-wage or fixed-rent arrangement. But a fixed-wage labor contract requires the landlord to absorb all the risk of agricultural production. A fixed-rent leasehold, on the other hand, forces the tenant to bear all the risk of production. Hence, if both tenant and landlord are risk averse, then a share contract will allow an optimal sharing of risk between them and will be chosen if the benefits from the division of risk outweigh the higher transaction cost of negotiating a share contract.

Figure 1
EFFORT LEVELS WITH PERFECT ENFORCEMENT
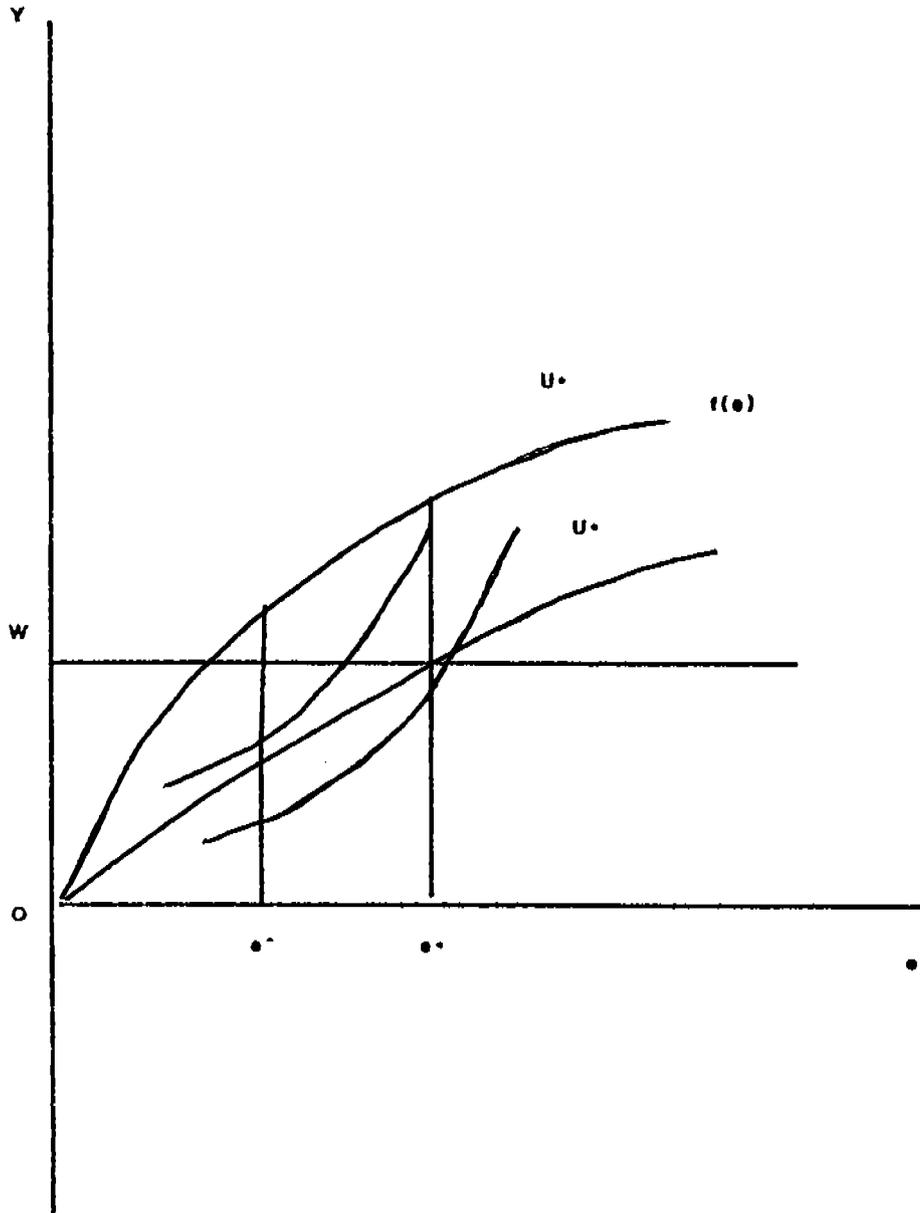
However, this division of risk between landlord and tenant can be attained by a mix of fixed-rent and fixed-wage contracts on the assumption that work effort is perfectly enforceable. This result is illustrated in Figure 2 which is adopted from Hirshleifer and Riley (1979). Assume two possible states of nature: a good state (g) and a bad state (b). The dimension of the box in Figure 2 shows the corresponding harvest, if either state arises. O_l (O_t) is the origin for the landlord (tenant). U^* is the reservation utility level for the tenant. The line O_lA is the certain income line for the landlord which corresponds to the fixed rent contract. The line O_tB is the certain income line for the tenant which corresponds in turn to the fixed-wage contract. The diagonal line O_tO_l corresponds to the pure share tenancy contract. To determine the share parameter of the tenant (α) of a contract like point E, the ratio O_tE/O_tO_l is taken. Hence the midpoint M corresponds to $\alpha = 0.5$. Any point within the area bounded by the lines O_tB and O_lA and not on the main diagonal represents a linear contract of the form $\beta + \alpha f(e)$. β is positive (negative) if the point lies below (above) the main diagonal. $\beta > 0$ implies a wage cum share tenancy contract while $\beta < 0$ is a fixed rent cum share tenancy contract. If the landlord is risk-neutral and the tenant risk-averse, the pareto-optimal outcome requires the landlord to absorb all the risk. In this case, only the wage contract will be chosen. If it is the other way around, the fixed-rent contract will be chosen. Now, if both landlord and tenant are risk-averse, then the optimal contract will be a (linear) share contract. This optimum is found where the contract curve intersects the reservation indifference curve U^* (at point E'). Note the pure share contract will be chosen only under the most exceptional of coincidences, i. e. only under the most exceptional of circumstances will the indifference curve U^* cut the contract curve along the diagonal.

However, this allocation of risk can be attained by a combined fixed-rent and fixed-wage contracts. The proof outlined below is essentially due to Newberry and Stiglitz (1979) and requires only the assumption of constant returns to scale. An alternative proof due to Allen (1984) drops even this assumption. The interested reader is referred to it. Let the landlord divide his fixed plot so that the proportion α' is rented out at a fixed rental R to his tenant and the remainder ($1-\alpha'$) is cultivated by the same tenant at the wage rate W. Let H be the size of the landlord's plot and assume the total amount of effort is contractually set at e = 1. Remember the case being considered assumes costless monitoring and enforcement of labor effort. Assume the production function F (H, 1) exhibits constant returns to scale. Now, consider a share tenancy contract of the form $\beta' + \alpha'F$ (H, 1). The landlord receives $-\beta' + (1-\alpha')F$ (H, 1). Now, set R such that $R = [(1-\alpha')W - \beta'/\alpha'H]$. Then the tenant's income is:

$$[F(\alpha'H, \alpha') - \alpha'RH] + (1-\alpha')W = F(\alpha'H, \alpha') = \alpha' F(H, 1) + \beta'$$

The landlord's income is equal to:

$$\alpha'RH + [F((1-\alpha')H, (1-\alpha')) - (1-\alpha')W] = F((1-\alpha')H, (1-\alpha')) - \beta'$$
$$= (1-\alpha') F (H, 1) - \beta'$$

Hence, this alternative mixing of pure-rental and pure-wage contracts replicates the outcome and the distribution of risk produced by the share contract. In a world where labor effort is fully enforceable, the introduction of uncertainty does not solve the puzzle why share tenancy contracts are chosen over fixed-wage or fixed-rental contracts.

Figure 2

ALLOCATION OF RISK ACCORDING TO LABOR CONTRACT
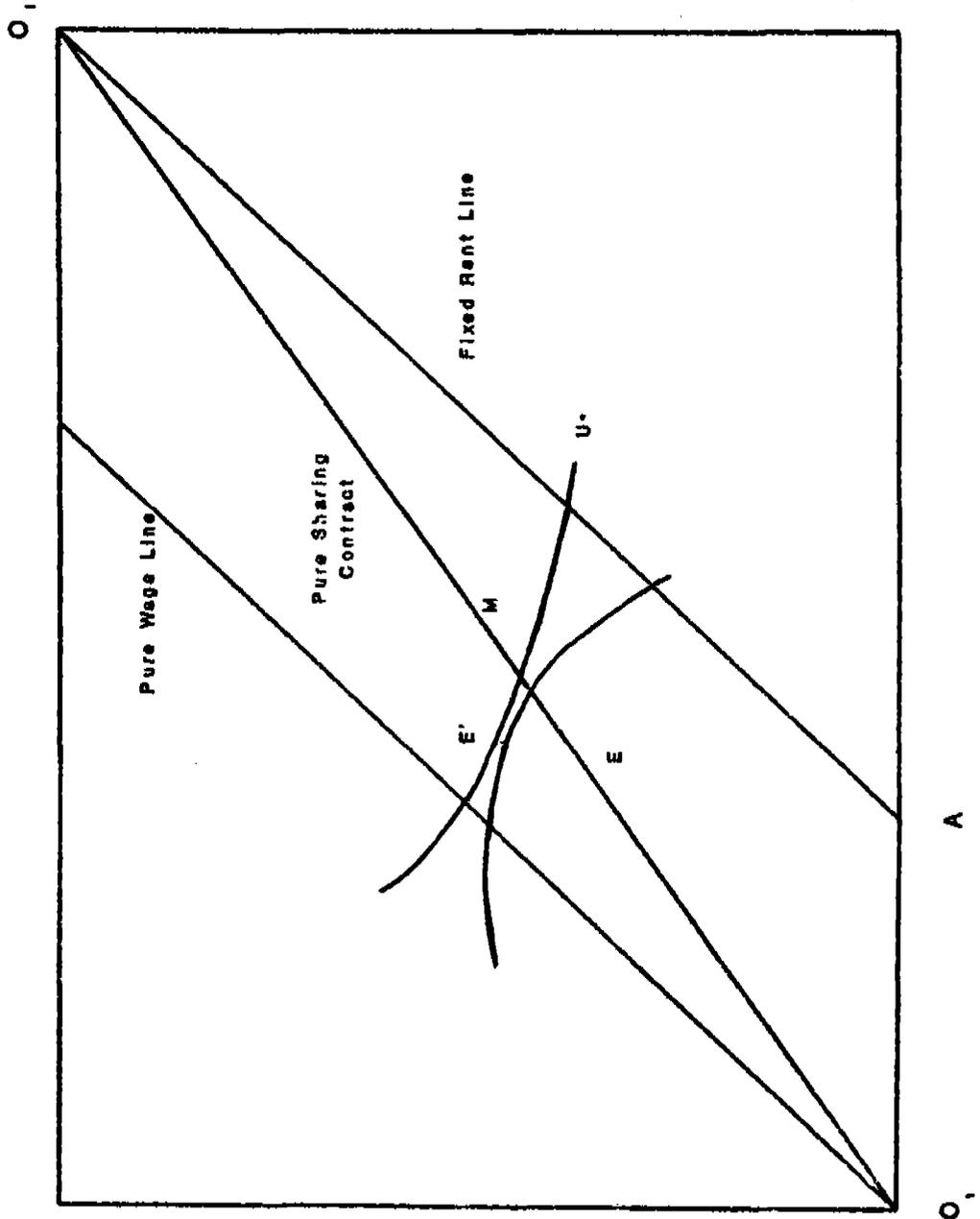
This has led Newberry and Stiglitz (1979) to argue share tenancy contracts should be seen as an institution trying to carry out two functions simultaneously: to allocate risk between tenant and landlord and to provide work incentives for tenants in a situation where effort is costly to monitor. They argue it is difficult to explain the existence of share tenancy contracts unless risk-sharing and work incentive features are recognized. If the only problem is that effort is costly to monitor, then there will only be fixed rent tenancy contracts observed. This is because under fixed-rent tenancy, the tenant is rewarded the full marginal product of his effort. Also if the only problem is risk sharing, then assuming tenants are risk-averse and landlords risk-neutral there will only be fixed wage labor contracts observed. Furthermore, a mixture of pure rent and pure wage contracts can replicate any risk-sharing property of a share tenancy contract. Adopting a share tenancy contract should then be interpreted as an attempt to balance these two considerations. As α goes to one, the tenant's work incentives are increased but he bears a higher share of the risk of production. As α goes to zero, the tenant's work incentives become dull but he bears less of the production risk. A share tenancy contract produces some sharing of the production risk while simultaneously providing the tenant with enough incentive to provide effort.

III. MODELLING INTERLOCKING CREDIT ARRANGEMENTS

The discussion of interlinking starts with the surplus extraction argument which sees interlinking as another instrument by which the landlord appropriates rent from his tenant. This is followed by an explanation of interlinking as a device to avoid the consequences of crop share restrictions. Third is the credit market imperfection explanation which sees interlinking as a spillover of credit-rationing in the formal financial sector. Next is an explanation of the models of interlinking credit and tenancy contracts where interlinking is seen as an attempt to deal with the dual problem of moral hazard and risk diversification left unresolved by the tenancy contract. Finally, the view of interlinking as a mechanism for screening is taken up.

A. *Interlinking as Surplus Extraction*

The idea that interlinking provides the landlord a way of extracting a higher rate of monopoly rent from his tenant was first broached by Bhaduri (1973 and 1977). The presumption of the Bhaduri model is that the landlord's social standing arises from his property right to land and usury. Because he usually owns no property, the tenant is rationed out of the modern capital market. However, his tenancy contract can serve as collateral to his landlord who then becomes the main source of credit. The stationary equilibrium in Bhaduri's model is then characterized by perpetual indebtedness of the tenant. His share of the crop is just enough for his consumption requirement and paying off the interest on his debt. It is, however, insufficient to pay off the principal. He assumes the landlord likes to preserve these two modes of exploitation and will resist adopting new technologies that increase output to an extent allowing the tenant to avoid this cycle of indebtedness.

One of the problems with the model is that it does not explicitly depict the interaction between the sharing ratio and the provision of credit (size of loan and the interest rate). Why is the landlord unable to maximize his income just by altering the share ratio, given his presumed monopoly power in the village? The issue can be framed more precisely in the following fashion. Imagine a village where landlords require tenants to borrow from them at a real interest rate higher than the alternative source

(the village moneylender). Let α be the current sharing ratio. Now suppose one landlord decides to untie his credit *cum* tenancy contract. He can keep his tenant at the same utility level as the other tenants in the village by requiring a higher share α' (where $\alpha' > \alpha$) for himself. The tenant will surrender a higher share of output to the landlord but will in return be able to obtain credit at a lower cost from the village moneylender. In equilibrium, the linked and unlinked contracts should result in the same welfare levels for the tenants in the village.

This analysis suggests the importance of analyzing the moneylending activities of landlords in the framework of the entire tenancy arrangement. In this view, there is nothing the provision of credit can add to the appropriation of surplus from the tenant that cannot be achieved by simply altering the share received by the landlord.

However, if labor is heterogeneous, a monopolist-landlord will be able to extract larger profits from tenants with an interlinked contract (see Braverman and Guasch 1984). The intuition for this is that the interlinked contract functions as a screening device that allows the monopolist-landlord to discriminate among high- and low-productivity tenants.

B. *Interlinking and Legal Restrictions on Crop Shares*

Braverman-Srinivasan (1981) emphasizes the role of legal restrictions on crop shares in the origin of interlinking. Two important arguments in the Braverman-Srinivasan paper involve a refutation of the idea that interlinkage represents an additional instrument for surplus extraction and explain the existence of interlinkage as a response to a legal floor on the tenant's crop share.

Credit interlinkage is considered a redundant instrument for surplus extraction because the landlord can achieve the same effect simply by altering the size of the tenant's land. Suppose agricultural workers have two employment alternatives: work as casual laborers and earn the utility level U^* or accept a share tenancy contract. Under profit maximization by landlords, the equilibrium will be characterized by each tenant being pushed to the reservation utility level U^*. This occurs simply with the landlord reducing the size of the plot assigned to each tenant. With a reduction in plot size the tenant must increase his work effort just to maintain his current production (consumption) level. Hence, the same output level can be generated from a smaller piece of land. There is, therefore, an incentive for the landlord to decrease plot size since his income is a decreasing function of plot size. So if in the initial tenancy contract the tenant's utility is greater than U^*, the landlord merely changes the terms of the contract so that a smaller plot size is assigned to the tenant. He decreases plot size until the tenant's utility is equal to U^* where a further alteration of plot size will drive the tenant away to the casual labor market.

The formal argument can be presented in the following way. Consider a tenant with a utility function $(U(c,e))$ that depends positively on current consumption (c) and negatively on his effort (e). Assume $U(c,e)$ is a strictly quasiconcave function and the following restrictions also apply:

$$(1.2) \qquad U_e U_{cc} - U_c U_{ec} > 0, \ U_e U_{cc} - U_c U_{ec} < 0$$

Here U_c, U_e, U_{cc}, U_{ee}, U_{ce}, and U_{ec} are the partial first and second derivatives of the arguments c and e, respectively. We assume naturally that U_{cc} and U_{ee} are both strictly negative. By Young's theorem, U_{ce}

$= U_{ec}$ The restrictions in (1.2) ensure consumption and leisure (which is defined as - e) are normal goods. Note that this implies that $U_{ce} = U_{ec} < 0$.

Let the tenant obtain the share α of his total output with the landlord getting the rest. Let the production function F(e, H) be linearly homogeneous in e and H where H is the size of the tenant's plot in hectares. Dividing through by H and letting $l = 1/H$, total output can be written as $f(el)/l$. Assume $f' > 0$ and $f'' < 0$. Note an increase (decrease) in plot size is represented by a decline (increase) in l.

Assume at the beginning of the period the tenant borrows his consumption for the duration and pays off the loan after output is realized at the period's end. He can borrow from the village moneylender at the interest rate r_a or from his landlord at the rate r_t. Let v be the portion of his total borrowing from his landlord. Then, his consumption will be given by:

(1.3) $c = \alpha f(el) / l[1+vr_t+(1-v)r_a] = \beta f(el)/l$

where $\beta = [1 + vr_t + (1-v)r_a]$ is the tenant's discounted share of output.

The tenant's problem is thus:

(1.4) $Max_e \ U(\beta f(el)/l, e)$

subject to $U = U^*$. The first-order condition is given by:

(1.5) $U_c f' \beta + U_e = 0$

The landlord's revenues per tenant is given by:

(1.6) $R = (1-\alpha)f(el)/l + v(r_t-\mu)\beta f(el)/l$

This can be rewritten as:

(1.6') $R = \{1-\beta[1+v\mu+(1-v)r_a]\}f(el)/l$

Here μ is the landlord's cost of capital assumed different from r_a. In principle, the landlord's problem is to maximize (1.6) by choosing α, v, r_t and l subject to keeping the tenant at the reservation utility level. But only the effect of a change in l on optimal e is needed to be examined.

Now $z = el$ is effort per hectare of land. Note R is an increasing function of z. Hence so long as dz/dl > 0, the landlord will have an incentive to reduce plot size. Totally differentiate the first-order condition (1.5) to get:

dz/dl = $[(\beta f/lU_c)(U_{cc}U_c-U_eU_{cc})+(z/lU_c)(U_{ec}U_c-U_eU_{ce})]$ D > 0

where   D = $U_{cc}\beta \ lf'' + [(U_e^2U_{cc}-2U_{ce}U_eU_c+U_{ee}U_c^2)/U_c^2] < 0$.

Hence, we conclude that in equilibrium, tenancy contracts will be characterized by utility equivalence, i. e. all tenants pushed to the reservation utility level U^*.

The second important result of Braverman-Srinivasan is that the landlord will interlink the tenancy and credit contracts if there is a floor on the crop share of the tenant. This will be the landlord's attempt at recovering the share of output that has been transferred to the tenant by law. The interlinked contract will involve charging a very high rate of interest for rather small loans. The formal argument goes something like this.

Let there be an initial equilibrium in which no linking takes place (v=0). The landlord's income is given by: $Y^* = (1-\beta^* \theta^*)f(ex) = (1-\alpha^*)f(ex)$, since $\beta^* = \alpha^*/(1+r_a)$ and $\theta^* = 1+r_a$. Here α^* is the initial crop share and r_a is the cost of credit from the alternative source. Now suppose a legal floor on the tenant's crop share (α_f) is imposed where $\alpha^* > \alpha_f$. The landlord can get arbitrarily close to his previous income Y^* by interlocking credit and tenancy contracts. This can be seen by considering the following sequence of tenancy cum credit contracts: $\alpha_n = \alpha_f$, $r_t = n$, $v_n = [(\alpha_f - \alpha^*)(1+r_a)]/n\alpha^*$. This implies the sequences $\beta_n = \alpha_f/[1+v_n n+(1-v_n)r_a]$ and $\theta_n = 1+v_n r_t+(1-v_n)r_a$. So as $n \to \infty$, $\alpha_n \to \alpha_f$, $r_t \to \infty$, $v_n \to 0$, $v_n n \to [(\alpha_f - \alpha^*)(1+r_a)]/\alpha^*$. Hence, $\beta_n \to \alpha_f/\{1+r_a+[(\alpha_f - \alpha^*)(1+r_a)]/\alpha^*\} = \alpha^*/(1+r_a) = \beta^*$ and $\theta_n \to 1+r_a$. Hence $1-\beta_n\theta_n \to 1-\alpha^*$.

Note the interest rate on the interlinked credit becomes arbitrarily large while the size of interlinked credit goes to zero. If the legal restriction does not exist, there is no incentive for interlinking since the landlord has essentially a redundancy of instruments for realizing his maximization objective.

C.   *Interlinking and Credit Market Imperfections*

Basu (1983) attributes the existence of credit interlinking to credit market imperfections. Interlinking provides a device for lowering the risk of strategic default. Basu assumes the labor contract chosen is a pure wage contract and effort can be fully enforced by the landlord so that the incentive problem does not exist. In his model, employers are the main source of informal lending. Potential risk in the credit market exists because lenders are unable to ensure repayment of a loan unless the borrowers are their own employees. This leads to what Basu terms 'isolation', a situation of a fragmented credit market with borrowing and lending taking place primarily between the employer and his employees.

Although a sole supplier of credit in this isolated market, the employer takes as parametric his employee's reservation utility level U^*. The employee's indirect utility function has the wage rate w and the loan rate i as arguments. His utility is increasing in w and decreasing in i. The employer's income comes from his farm's output and interest revenues. His costs are the cost of labor as well as the alternative cost of his funds.

Isolation can lead to interlinking of credit and wage contracts even without any imperfection in the labor market. To see this, assume w* is the given market wage rate. Let L(i) be the demand for loans by the employee and i* be such that L(i*) = 0. Suppose U*, the reservation utility level satisfies: U(w*, i*) = U*. That is, the reservation utility level is equal to utility of the employee if he accepted a wage offer w* without being able to acquire credit. Think of the pair (w*, i*) as an unlinked wage-credit contract. Now so long as dU(w*, i*)/dw* > 0 and dU(w*, i*)/di* < 0, then there are linked contracts

(w, i) with w < w* and i < i* such that the employee will be indifferent between the linked and the unlinked contracts. The employer will be willing to offer a loan at a rate i below i* if the wage rate is sufficiently lowered below w*. Reducing i below i* lowers the wage component of the employer's cost per worker by dw/di. However, his interest cost per employee goes up by L(i) + i dL(i)/di. Hence so long as dw/di > L(i) + idL(i)/di, then the employer will find it advantageous to continue reducing the interest rate since wage costs fall more than the rise in interest costs. Hence, it will be possible to observe situations in which workers receive less than w* though no imperfections exist in the labor market. The important point about Basu's explanation of interlinking is that it suggests that linked markets are competitive, even though taken individually they may not appear to be so.

D.   *Interlinking and Moral Hazard*

Share tenancy is thought to balance the provision of work incentives with risk-sharing. Although pushing α to one will improve resource allocation, the resulting increase in risk borne by the tenant might be so high this would be untenable. The imperfect work incentives provided by share tenancy contracts is compensated for by the welfare gains arising from risk-sharing. This means that a mechanism which increases work incentives while holding the allocation of risk constant will benefit the landlord. Braverman and Stiglitz (1982) and Mitra (1984) argue that interlinking might be a way for the landlord to minimize shirking by his tenants.

The principal-agent problem arises in a situation when the principal cannot completely specify the agent's actions but at the same time the agent's actions have an important bearing on the principal's welfare. In case of share tenancy, the tenant's incentive to exert effort is diluted since he obtains only a share of his marginal product. Furthermore, the tenant usually has significant discretion in actions taken on the farm. Hence to a large extent, it will be costly for the landlord to completely monitor the tenant's effort and enforce the pattern of behavior the landlord feels is desirable. If the output of the tenant is also affected by the vagaries of weather and pests, the landlord cannot directly infer the amount of effort based on realized output. This leads to a situation in which the landlord has an incentive to induce more effort from the tenant. This inducement mechanism may be provided by linking the provision of credit with the tenancy arrangement. Note the argument for interlinking provided by Braverman-Stiglitz depends only on the existence of a moral hazard problem and envisions no imperfection in the capital market as does Braverman-Srinivasan. That is, so long as greater indebtedness by the tenant induces more effort, the landlord will find it worthwhile to tie credit with the tenancy contract.

Braverman and Stiglitz's (1982) model is helpful in illustrating some of these ideas. Assume the size of plot is fixed at $l = 1$. Next, introduce uncertainty by making output subject to the vagaries of weather or technology shocks. Hence, realized output can be written as f(e)g, where g is the output shock with mean and variance normalized to unity. Finally, assume the tenant has borrowed an amount B at the start of the period and needs to repay B(1+r) at the period's end.

The tenant's maximization problem is then: Max $_e$ E[U(αf(e)g - B(1+r),e)]. The first-order condition for effort is:

$$(1.7) \qquad \alpha E[U_c f'g] + E[U_e] = 0$$

Totally differentiate (1.7) with respect to e and B to get:

$$de/dB = E(U_{cc}\alpha f'g)/E(U_{ee}+E U_c\alpha f''g+2 EU_{ce}\alpha f'g +E U_{cc}(\alpha f' g)^2] > 0$$

An increment in the indebtedness of the tenant increases his effort. Note this result depends only on the assumption consumption and leisure are normal goods (equation (1.2)).

Now consider the design of an optimal tenancy contract between the landlord and the tenant where the landlord offers credit B in the initial period and demands a repayment of B' at the end of the period. The implicit interest rate charged by the landlord can be a function of the size of the tenant's borrowing. Assume both the landlord and tenant can borrow at the same rate μ from the capital market. Braverman-Stiglitz shows that since de/dB > 0, profit-maximizing behavior by the landlord will lead him to tie credit with the tenancy contract so that he subsidizes the tenant. The proof is relatively straightforward.

The landlord's problem is to maximize:

(1.8) $Y = (1-\alpha)f(e) + (r-\mu)B$

subject to the reservation utility of the tenant.

(1.9) $E U[B, e,\alpha f(e)-(1+r)B] = U^*$

The solution to this problem entails setting $[(dY/dB)/dY/dB^{\wedge})] = [(dU/dB)/(dU/dB^{\wedge})]$, i. e. setting the marginal rate of substitution (MRS) of the landlord equal to the MRS of the tenant. But the MRS of the tenant is equal to:

$1/[(1-\alpha)f'(e)de/dB^{\wedge} + 1]$. Hence in equilibrium:
(1.10) $U'(c_0)/E U'(c_1,e) = (1+\mu)/[(1-\alpha)f'(e)de/dB^{\wedge} + 1]$

In a perfectly competitive capital market, the MRS between present and future consumption should equal one plus the real interest rate.

(1.11) $U'(c_0)/U'(c_1) = 1 + \mu$

Comparing (1.10) with (1.11), this means that the landlord finds it optimal to lower the real cost of borrowing for the tenant to induce him to go into greater debt.

E.   *Interlinking and Risk*

While Braverman and Stiglitz (1982) and Mitra (1984) focus on the work-incentive effects of interlinked credit arrangements, Kotwal (1985) emphasizes the risk-sharing effects. Given a particular share contract with its associated set of work incentives and risk sharing features, is there a mechanism for further attenuating the risk faced by the tenant? In his view, the provision of credit by the landlord is a state-contingent side payment to minimize fluctuations in the tenant's income. The landlord extends

financing during bad harvests while demanding repayment during unusually good periods. This explanation is consistent with the observed frequency of roll-overs of loans and the accumulation of large debts by tenants with little chance of being repaid.

The argument can be put in the following way. Let $y = f(e) + \theta$ be aggregate production with θ representing the weather shock to output. Assume θ has mean zero and variance equal to var (θ). Assume that we have a linear tenancy contract of the form: $\gamma = \beta + \alpha y = \beta + \alpha f(e) + \alpha \theta$, where γ is the income of the tenant. The variance of the tenant's income is var $(\gamma) = \alpha^2$ var(θ). Now consider the following alternative contract: $\gamma' = \beta' + \alpha'[y-f(e^*;\theta)^\wedge]$. Here, $f(e^*;\theta)^\wedge$ represents the landlord's best guess of the output level, if effort is set at the optimum level e^*, given the state of the weather. In other words, $f(e^*;\theta)^\wedge = f(e^*) + \theta + \delta$. Here, δ is the estimation error with mean zero and variance equal to var (δ).

An interpretation of the contract γ' goes something like this. The landlord attempts to compensate for fluctuations in the tenant's income from the share contract by demanding a side payment during good years and handing it out during bad years. Weather-caused fluctuations in the tenant's income arise from the behavior of the term θ. During good (bad) years, θ is positive (negative) and so output is high (low). Hence, the alternative contract introduces the compensating mechanism - $\alpha'f(e^*;\theta)^\wedge = -\alpha'[f(e^*) + \theta + \delta]$ that reverses the impact of θ. During good years (a positive value of θ), the amount $-\alpha'\theta$ is added to the tenant's income, while during bad years (a negative value of θ), the amount $-\alpha'\theta$ is added to the tenant's income. Note the state-contingent side-payment $-\alpha'\theta$ behaves much like the flow of financing between tenant and landlord. During hard times, when tenants are expected to ask their landlord for loans, the side payment $-\alpha'\theta$ is positive. During good times, when tenants are anticipated to want to pay back their loans, the side payment $-\alpha'\theta$ is negative.

Now, write the alternative contract as: $\gamma' = \beta' + \alpha'[f(e)-f(e^*)]-\alpha'\delta$. Set $\alpha' = \alpha$ and $\beta' = \beta + \alpha'f(e^*)$ so that $\gamma' = \beta + \alpha f(e) + \alpha \delta$. The variance of γ' is var $(\gamma') = \alpha^2$ var(δ). Hence if the error of estimation δ has a smaller variance than the shock variable θ, i. e. var $(\theta) <$ var (δ), then the alternative contract γ' pareto-dominates the first contract. This is because both contracts give the same expected income to the tenant but contract γ' is less risky than γ. A share contract with state-contingent side payments pareto-dominates a share-tenancy contract without side payments. This proof, however, requires that $f(e^*)$ be known. Kotwal's explanation suggests one need not appeal to capital-market imperfections or any moral hazard problem to explain interlinked credit arrangements. The fundamental explanation lies in the inefficiency of share tenancy as instrument to dissipate risk.

F.   *Interlinking As a Screening Device*

Braverman and Guasch (1984) provide another rationale for credit and tenancy interlinking. Suppose that the available pool of labor differs in ability. A worker of type i, assigned to a fixed plot of land, is assumed to provide a particular grade of labor e(i). Each worker must also work with some capital with the more able workers generating a higher marginal product of capital. Now let us further assume that workers are observationally indistinguishable. Then landlords will have an incentive to develop screening mechanisms to sort out the different grades of workers. They want to acquire the higher grade of workers as tenants to make capital more productive and generate a higher level of output. The interlinking of credit and tenancy contract can be a screening device.

Landlords offer each prospective tenant i (1) a share-tenancy contract with a fixed share α (determined by convention or by law) and (2) credit b(i) at the the tenant. The idea is that the interlinked contract forces self-selection among the workers with the more able workers choosing contracts offering a higher level of credit (and hence capital). This is because they have the higher marginal product of capital. Now, the workers maximize a utility function $U_i[b(i),r(i)]$ subject to a reservation utility level of at least U*, as the level of welfare from unattached labor.

Let ¶ [b(i),r(i)] be the landlord's income from the interlinked contract. The landlords behave as monopolistic competitors. In equilibrium each one will be attached to a particular grade of labor but the profit of the landlords form any given contract will be the same. In particular, let the workers indexed n be the lowest grade of labor that end up as share tenants. Their utility must equal the reservation level U* and let ¶* be the level of profits of the landlords who employ them. Then in equilibrium, all landlords earn the amount ¶*.

The equilibrium in this model turns out to be a sorting equilibrium.[5] In this sorting equilibrium, the more able tenants choose to borrow a greater amount of capital. With a higher marginal product of capital, they should produce more output than less able tenants. Since the equilibrium is characterized by equality of profits among landlords, the employers of the more able must tenants must offer a lower interest rate to their tenants. Hence in equilibrium, the loan-interest rate schedule is downward sloping.

It is not clear whether the sorting equilibrium produced by the interlinking is a pareto-efficient, since the capital chosen by each grade of labor cannot be less than in the first-best world (where each grade of labor is distinguishable). Hence, the screening might induce a substantial overinvestment in capital by each grade of labor to distinguish it from lower grades.[6] The departure from pareto efficiency obviously depends on how close the different labor types are.

IV.   PRODUCT AND CREDIT MARKET INTERLINKING

The linking of credit and product marketing contracts has received far less attention than the linking of share tenancy and credit. At the same time, more consideration has been given to the latter case of interlinking in the Philippines where interest centers on rice and the peculiar mix of historical circumstances involving the "green revolution" and land reform.

Starting in the mid-1960s, a drive by the public sector in this country was initiated to encourage the widespread adoption of modern rice varieties. The advent of the green revolution yielded significant increases in rice production specially in Central Luzon. The result was a large amount of rice surplus

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5. A sorting equilibrium can be defined as a set of contracts S(i)=(b(i), r(i)) such that:
  (i) for I > n, $U_i[b(i),r(i)]>U_i[b(j),r(j)]$ for all j;
  (ii) for i=n, $U_i[b(i),r(i)]=U*$;
  (iii) for i>n $\pi[b(i),r(i)]=\pi*$.
This means each category of labor, i, strictly prefers the contract i. Labor type n (the lowest grade of labor to get tenancy contract) gets the reservation utility level and landlords get the going rental rate on land.

6. This result is familiar from models of signalling (Spence 1974).

to move from farms to markets in urban areas. The demise of the traditional landlord-tenant relationship ruptured ties involving credit. A new set of ties has evolved in the meantime involving large traders requiring reliable and low-cost sources of rice as well as farmers with continuing needs for both financing and transporting output from farm to market.

In the extensive literature on tenancy and credit interlinking, the idea that the institution of share tenancy attempts to balance the problems of moral hazard and allocation of the risk of production provides a natural handle for explaining interlinking. Interlinking provides an added instrument for reducing moral hazard (Braverman and Stiglitz 1982; Mitra 1984) or achieving a better distribution of risk between landlord and tenant (Kotwal 1985). That natural handle is missing in the issue of why marketing and credit contracts are interlinked.

One of the first questions to ask is: do trader-lenders primarily employ credit interlinkages to facilitate trading activities (Geron 1989; Floro and Yotopoulos 1991) or do they basically avail of output interlinking to lower risk of strategic default of borrowers (Bell 1990, Hoff and Stiglitz 1990, Siamwalla and associates 1990 and Udry 1990)? This question is central because it focuses on the exact information and incentive problems being addressed by interlinking. If the latter is the case, then the entire issue of output-credit interlinking is best framed as a contractual mechanism that allows creditors to better screen borrowers, provides greater incentives for repayment and strengthens enforcement of repayment (Hoff and Stiglitz 1990). If the former is the case though, then interlinking can be explained as a mechanism the trader access to supply or smoothing fluctuations in the farmer-lender's delivery of marketable surplus.

Udry's paper (1990) is intriguing because of the absence of interlinked contracts in his study area in Nigeria. Given the seemingly ubiquitous nature of interlinking in less developed agrarian economies, it is a valuable piece of empirical work in that it leads to the consideration of conditions interlinking is unnecessary. He conjectures that its absence in this particular study area is due to lack of any significant moral hazard or adverse selection problem in the small, closely-knit community. About half of the variability in income is idiosyncratic with slightly more than half being accounted for by village-level shocks. Hence, borrowing and lending among members of the village, deemed as insurance against idiosyncratic risk, create substantial benefits.

Diversification of risk across communities is served by a class of merchants with long-term relations with other merchants across Nigeria. These traders may lend to local villagers but do not require interlinking because of familiarity with borrowers and local events. They may in turn obtain some of their credit from merchants outside the village with perhaps the long-term and historic nature of these trading ties serving to discourage a likely strategic default

On the other hand, Floro and Yotopoulos (1991) explain credit and output interlinking as profit-maximizing behavior by the trader-lender, without any explicit assumption about imperfections in credit or output markets. Their explanation for interlinking is that the lender's profit rises by increasing his share of the trade in marketable surplus. The drawback of their model is that it solves a simple profit-maximization problem by the trader in which case the Kuhn-Tucker conditions only generate an offer curve for a bundled (interlinked) contract. It does not have a reciprocal offer curve from the borrower and hence the borrower's incentives for accepting a bundled contract are unclear. The way that the profit

maximization problem is set up, there are market prices for unlinked credit and marketing services. The existence of these prices deepen the puzzle why interlinking can achieve a pareto superior allocation over the competitive equilibrium (when contracts are unbundled).

There are at least two important incentives why the lender will accept a bundling of the contract -- if it manages to reduce his cost of marketing his own output and if he is credit-rationed. Hence, it should be assumed that the borrower is credit-rationed and that the price of unlinked credit observed is really the prevaling price in the formal sector of a "dualistic" financial system.

Geron (1989) suggests interlinking is desirable for the trader because it increases his command over marketable surplus and desirable for the farmer since it lowers marketing costs. This point is not developed any further though since her concern is more with characterizing the relationship between the price at which the trader will purchase the farmer's product and the interest rate on the loan. Given that interlinked contracts exist, what is the expected relationship between price and interest rate and does this relationship vary with the nature of the borrower? Geron assumes two distinct motivations of borrowers: --consumption (Type 1) and purchases of inputs (Type 2). With Type 1 borrowers, the lender encounters some moral hazard problem because the loan size (hence, the level of consumption) will affect the borrower's optimal level of effort. This effect on effort is important to the lender because it will determine the output size the borrower can make available to the lender for marketing. Geron assumes lenders can distinguish between two types of borrowers. This distinction of borrower types seems a trifle arbitrary since it is unlikely lenders can adequately monitor the use of funds unless the lender provides credit in kind (fertilizer, pesticide, etc.). With significant monitoring costs, lenders will always face significant moral hazard problems in their lending decision.

It turns out the resulting iso-profit or indifference curves of either type of borrower is positively-sloped in the price (P) and interest (i) space. Profit-maximization by the trader-lender then requires him to choose that combination of i and P such that the marginal cost from decreasing i or increasing P just equals the marginal gain from increased effort induced from the farmer-borrower.

There is good reason to believe more research in credit and output interlinking will lead to more insights into motivations underlying these bundled contracts. It is likely that at the root of these bundled contracts lie the problems of asymmetric information successfully utilized to explain various aspects of agrarian economies. At the same time, current explanations of output-credit interlinking have not satisfactorily addressed the other role of the lender as trader or provider of marketing services. To what extent do production risk, the trader's desire to gain access to a stable and adequate supply of marketable output, the cost of storage, and output price variability influence the desirability and terms of interlinked contracts, if at all? Framing some of the issues this way will yield a richer and more substantial data base on interlinked output and credit contracts.

V.   LAND AND CREDIT INTERLOCKING

According to Floro and Yotopoulos (1991), the observed provision of credit by farmer-lenders involving the tying of usufruct rights on the land owned by borrowers constitutes interlinking. The bundling of these transactions is desirable to borrowers because they are credit-rationed by formal

creditors or the village moneylender. On the other hand, the lender can, by appropriately choosing the borrower and the terms of the credit contract, influence the incidence of default. For the individual interested in increasing ownership of land, this provides a cheaper way of acquiring more land.

If there are legal impediments restricting the current owners' property rights to his land, then interlinking reflects the spillover of these obstacles to the credit market. More importantly, the existence of interlinking now need not require that the lender be able to induce a greater probability of default by borrower. The dilution of property rights to land acquired through land reform in the Philippines arises from the restriction on land transfers only to the direct heirs of the beneficiary. In a situation in which enforcement of these restrictions is far from perfect, the transfer of land rights to individuals other than heirs can still take place, although on a temporary rather than permanent basis. The partial effectiveness of the prohibition makes the appropriateness of the stream of rentals on land far down the future more uncertain than in the current period. For the farmer interested in acquiring more land to cultivate, a rental market might be better for him because he can hedge against the possibility of being caught in violation of the law. The owner of the land may in turn be credit-constrained in the formal financial sector because his land is insufficient collateral, given that rights to it cannot be transferred. The provision of credit rather than a pure rental agreement will be desirable to hedge against a future default.

Such an explanation is deemed more consistent with the evidence provided by Otsuka (1991) and Nagarajan and David (1990) regarding the increasingly prevalent practice of land pawning in Central Luzon. In these pawning arrangements, credit is provided to a borrower in exchange for temporary cultivation rights to the borrower's property. According to Nagarajan and David, 42 percent of such contracts fall below two years in duration and about 70 percent of such contracts are made with relatives, business associates or friends. Cases of a permanent transfer of land rights apparently occurred infrequently.

Otsuka (1991) argues that compared to other South Asian countries, land reform under the Marcos government was relatively successful, especially in Central Luzon. For farmlands below seven hectares, share tenants were converted to leasehold tenants with amount of lease fixed under law. For farmlands exceeding seven hectares, excess land was transferred to current share tenants provided land titles acquired this way could only be transferred to legitimate heirs. This period also coincided with the spread of modern rice varieties (the "green revolution") with returns to land planted to the modern varieties increasing substantially over time. A secular shift rightward of the market demand curve for rice lands was observed while the prohibition against resale of lands acquired under land reform limited the amount of land that could be transferred. Pawning emerged as a surrogate for a land market. Buyers (sellers) interested in acquiring (disposing of) temporary or even permanent land rights could transact in the surrogate market since the land market could not develop under the prohibition.

Land is a durable asset whose returns R(t) are spread out over time. Assume R(t) as output less payments to the variable factors of production, i. e., rent. Ownership of land then confers a right to appropriate those rents R(t). Let δ be the instantaneous discount rate and V(t) be the value (price) of land. If the function R(t) is known, then:

$$(4.1) \qquad V(t) = \int_{t}^{\infty} \exp(-\delta s) R(s) ds$$

That is, the market price of land is simply equal to the present value of the rental stream. Prohibitions on outright transfers of land held by land reform beneficiaries can be thought of as lying on a continuum of effectiveness. At one extreme, the enforcement can be so lax so that the land market is completely unaffected by the introduction of the legislation. In this case, the acquisition price of land continues to be given by (4.1) and the purchaser appropriates the discounted value of the entire stream R(t). At the other extreme, it is possible for such restrictions to be absolute such that the price of land is undefined since no market transaction takes place. The stream of rents is inappropriable by anyone other than the current beneficiary and his heirs. In between lies a region of varying degrees of success in enforcing the regulation. A natural way of thinking about what it means for the prohibition to become more effective is to imagine that the appropriability of future rents to anyone else becomes increasingly uncertain.

Let F(t) be the cumulative probability that the prohibition becomes binding at time t where F'(t) is the corresponding probability density function. Assume this means that the individual gets caught violating the regulation, thus losing the rental stream beyond period t. Assume further there exists a T such that F(T) = 1. An increase in the effectiveness of the prohibition is seen as a decrease in the value of T. This reduces the duration that the purchases are able to appropriate the rents from the land. The expected purchase price is now:

$$(4.2) \qquad E[V(t)] = \int_t^\infty [\int_t^\infty \exp(-\delta s) R(s) ds] F'(\tau) d\tau$$

Noting that F'(t) = 0 for t > T and integrating by parts lead to:

$$(4.3) \qquad E[V(t)] = \int_t^T \exp(-\delta s) R(s) [1 - F'(s)] ds$$

The prohibition has two effects.[7] First, the effect of the uncertainty is to effectively truncate the horizon in which the purchaser expects to enjoy the benefits of ownership from land. The result is the development of a surrogate land market where land is leased for a duration of T. A rental market arises as a way for agents to hedge the risk from being caught violating the prohibition. Short-term leases of land will be less risky than outright sales. Second, the prohibition results in a sharper discounting of the expected stream of earnings over that truncated horizon with the additional discount factor being 1-F'(t). The uncertainty associated with the legal prohibition results in undervaluation of the rental stream relative to what would have occurred in a situation where property rights are fully conferred upon land reform beneficiaries. This indicates that undervaluation of rental values need not be attributed solely to monopoly power exercised by lessees over lessors.

Credit rather than direct rental payments is viewed as a way of getting around the legal restriction on the transfer of usufruct rights to land. The empirical evidence on land pawning is consistent with this view that cash advances provided by "lenders" have the same character as payment for land leases. The observed interlinking is not a response to some technological feature of the rural landscape as is true in the share-tenancy with credit contract. In the latter, interlinking arises as a response to the problem of moral hazard. Legal restrictions on property rights provide the rationale for the development of a land lease market in which rental payments are then hidden in the guise of credit. This analysis suggests that

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7. The result should be familiar from Yaari's (1965) classic article on uncertain lifetimes.

although these restrictions on property rights to land may have a benevolent motivation (to prevent a resale to previous owners), they have the undesirable effect of devaluing the collateral value of land owned by the land reform beneficiaries. Ultimately, these restrictions make land reform beneficiaries poor credit risks from the point of view of formal financial institutions and undermine their access to these institutions.

VI.   WELFARE AND POLICY ANALYSIS

Given the various explanations advanced for credit interlinking, an assessment of the welfare impact of different types of policy interventions may now proceed. The policy prescriptions for evaluation are: banning of interlinking and land reform.

A.   Banning Interlinking

Much of the interlinking literature view the bundling of contracts as a welfare-increasing institution. Certain quarters continue to have misgivings about the welfare effects of these bundled contracts (Floro and Yotopoulos 1991) but for the most part, they are viewed as increasing efficiency. In the moral hazard literature, the bundling minimizes shirking and shifts the allocation of effort closer to the pareto-efficient level. In the risk-reduction literature, the bundling of contracts lowers the risk of agricultural production for the risk-averse peasant and shifts the allocation of risk closer to the pareto-optimum (all the risks borne by the risk-neutral landlord and none by the tenant). In the credit market imperfection literature, the bundling allows pareto-improving trades in which a reduction in wage rates is compensated for by the availability of finance. Given this presumption, any restriction on interlinked contracts will have an adverse effect on welfare and efficiency.

However, it might be instructive to clarify how the presumed gains are distributed between the landlord and tenant. Interlinking can be thought of as shifting the utility possibility frontier of both tenant and landlord. Figure 3 shows the utility possibility frontier for the landlord and tenant before and after interlinking. The vertical axis measures the landlord's income (which given risk neutrality is linearly related to his utility) and the horizontal axis measures the tenant's welfare. The curve UU is the utility possibility frontier without interlinking and U'U' is the utility possibility frontier with interlinking. It lies farther out than UU because of the efficiency gains arising from less shirking, or a better allocation of risk, etc. Assume the initial allocation of welfare is given by point A. The question is, where will the new equilibrium allocation be with interlinking? A point like point B, which is an allocation that improves the welfare of both parties in the transaction, is possible. But points like C (in which the tenant loses from interlinking) or point D (in which the landlord loses from interlinking) are also possible. The idea that interlinking is welfare improving means that the utility possibility frontier is shifted out. But it does not mean that the division of the benefits from interlinking accrues equitably to both parties or guarantees that no party loses from it.

Interlinking as a voluntary transaction in no way invalidates a point like C or D being achieved. The phenomenon being described here is analogous to the effects of technological change in agriculture which faces an inelastic demand for its product. It is rational for the individual farmer to want to increase income by innovating. But when all farmers adopt modern agricultural practices and become more pro-

Figure 3
UTILITY POSSIBILITY FRONTIER
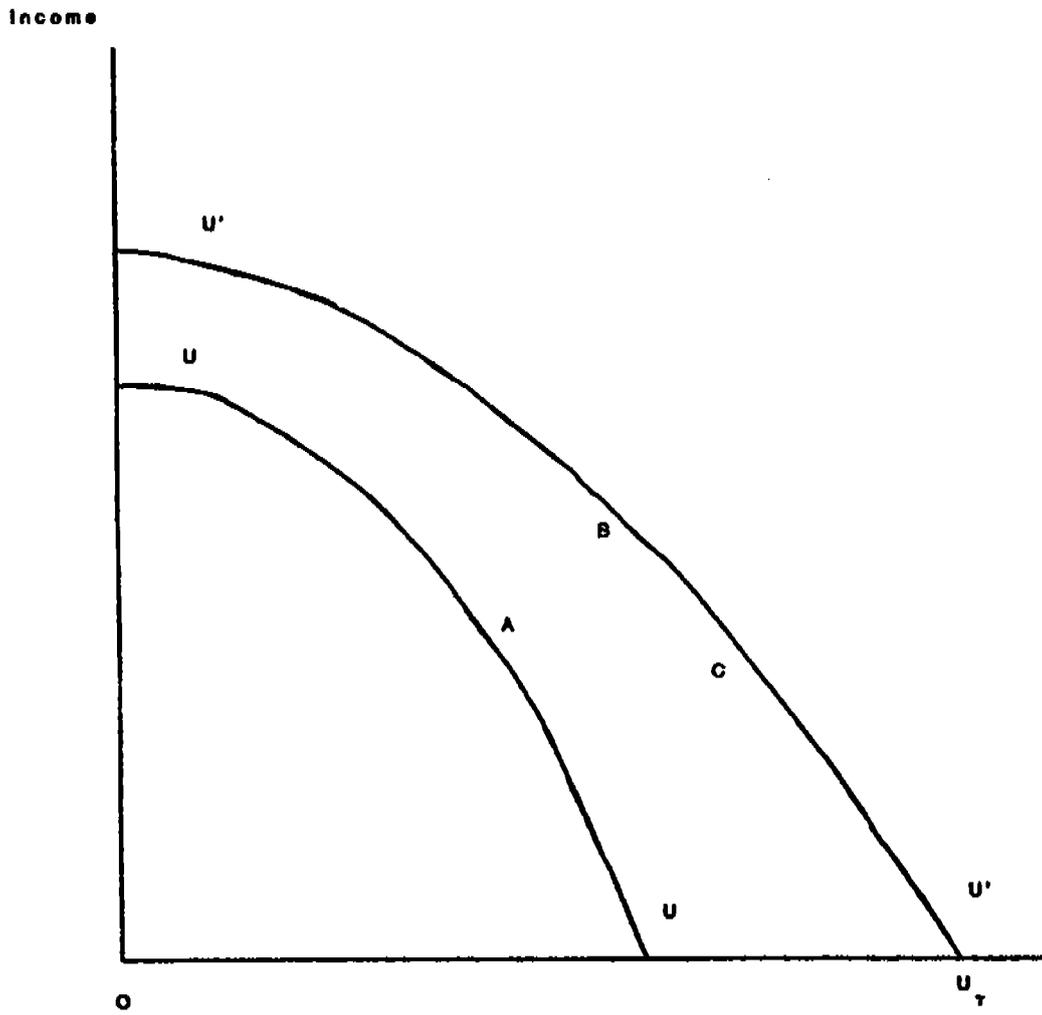
ductive, the resulting shift in the supply curve depresses food prices and lowers total farm income. Of course, if the individual farmer does not undertake to increase his productivity, the reduction in his income will be greater since the reduction in price is not offset by an increase in total output.

Banning interlinking is tantamount to shrinking the utility possibility frontier and will always involve a welfare loss for at least one party. Policymakers who are concerned with the monopoly power of landlords in these bilateral trades should be directed to find ways of redistributing the gains from interlinking instead of trying to outlaw the institution itself. Since interlinking involves a shift outward of the utility possibility frontier, it will always be possible, in principle, to redistribute the gains in such a way that no one ends up worse off. Such policies might involve the rehabilitation of rural banks, encouraging NGOs to compete as lenders or developing credit cooperatives in the rural areas. The ability of these institutions to generate loanable funds efficiently and respond to requirements of small farmers on a sustained basis remains an open question.

B. *Land Reform*

The Comprehensive Agrarian Reform Law (CARL) envisions a much wider application of land reform to include important crops like coconut and sugar left out in the land reform act of 1972. This is bound to rupture the traditional credit relationship between landlord and tenant. However, there is a general presumption in the tenancy-credit interlinking literature that land reform will result in an unambiguous increase in the share tenant's welfare. This will occur even though the tenant might be forced to seek credit at a price much higher than his landlord is willing to provide.

The Braverman-Srinivasan model is useful to work out the welfare analysis.[8] Prior to land reform, assume the landlord is the cheaper source of credit ($r_l < r_a$) so that the tenant's consumption and the landlord's income are:

$$(5.1) \qquad C = \beta f(ex)$$
$$(5.2) \qquad Y = (1-\beta\theta)f(ex)$$

where $\beta = \alpha/(1+r_l)$ and $\theta = 1 + r_l$. The move to land reform can be decomposed into two steps -- the tenant must acquire his finance at the higher cost r_a, and his share of the harvest (α) goes to one.

But with no restriction on the crop share, the landlord can always choose α such that he attains his previous β. That is, set it to $\alpha' = \alpha(1+r_a)/(1+r_l)$. The tenant's consumption is given by:

$$(5.3) \qquad C' = \alpha'/(1+r_a)f(ex) = C$$

Now however, the second step implies α' is adjusted towards unity which results in an unambiguous increase in consumption and hence welfare for the tenant.

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8. It is important to note though the model proceeds from the absence of any uncertainty; hence, the unbundling of the linked contract as a result of land reform is going to entail less cost to the tenant.

This still leaves the central issue of where the credit needs of the new landowners are going to be met unresolved. A comparison with the land reform experience in rice might be misleading because land reform was accompanied by technological change. The increase in rice productivity allowed a natural linking of interest between rice farmers and traders. This is unlikely to be replicated in sugar and coconut, where productivity has been lagging for decades and no signs of significant progress are seen.

In principle, the new landowning class can become attractive to the formal financial sector since the newly-acquired lands can serve as collateral. This interest might be accentuated if the land reform program is accompanied by a support package including infrastructure and extension. This public investment might increase farmers' expected incomes and reduce the risks of peasant agriculture and both factors should work to increase the market value of land.

In this regard, it is important to emphasize the design of land reform laws which must be subjected to intense economic scrutiny because no matter how well-meaning these might be, they may tend to produce quite unwelcome or unexpected consequences. This result emerges quite clearly in section four in a discussion of how restrictions on property rights to newly-acquired land have the effect of devaluing the market price of the transferred property.

The rationale for imposing these restrictions on resale has to do with preventing a return of land to previous owners. It might be argued that the reversion of land to the original owners and the resulting concentration of land ownership is socially undesirable. It is difficult to gauge how real these fears are. First of all, the original owners have undergone a capital loss in of the forced sale of their property to the state. Second, a land reform program accompanied by a package of support services provided by the state ought to increase the productivity of land and make it more attractive to keep. Finally, proponents of land reform have always argued the equity consideration is the most important objective. Whether the beneficiary then decides to keep the increase in wealth in the form of land, more human capital or financial assets should be irrelevant to the goal of moving towards a much fairer distribution of assets. Rates of return on other assets are possibly higher than in land, thus forcing these new owners to hold their windfall gain in the form of land which is not going to be pareto efficient. Even if the beneficiaries decide to resell to the original owners, this will not involve a return to the status quo ante since the former will be benefitted to the extent of the repurchase price of the land. If the new owners are to draw full advantage from the results of the redistribution effort, property right restrictions ought to be done away with altogether.

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