Agroforestry Systems **33**: 215–230, 1996.

Durian trees (*Durio zibethinus* Murr.) in Javanese home gardens: their importance in informal financial systems

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Key words: farm credit, household economy, *ex post* analyses, Javanese homegarden

Abstract. Home gardens used to be an important source of income and wealth for many Javanese rural households. In the wake of economic development and income diversification processes, their role is increasingly linked to credit needs. People borrow money by pawning (*gadai*) trees from home gardens. The tree harvest is at the disposal of the lender during the loan period. Analysis of more than 80 oral *gadai* contracts on durian trees in West Java demonstrates that the real interest rate is not usurious and can be compared to other formal and informal credit interest rates. It also shows that distributions of loan rates and loan amounts do not differ according to their final use (consumption or investment) or to the family relationship between the two partners of the transaction.

Résumé. La place des agroforêts javanaises (*home garden*) dans le budget des ménages décroît par suite du développement global et de la diversification croissante des activités. On observe un phénomène de concentration et, seuls les ménages riches en patrimoine possèdent des agroforêts. Une grande partie de ces ménages rencontre cependant des difficultés de trésorerie. Un des moyens de s'affranchir de cette contrainte consiste à emprunter contre la mise en gage (*gadai*) d'arbres des agroforêts. Le coût de l'emprunt correspond à la production de l'arbre qui revient au prêteur pendant la durée du prêt. L'analyse de 80 contrats oraux de *gadai* portant sur les durians (*Durio zibethinus* Murr.) montre en particulier que le coût réel du *gadai* n'est pas usuraire comparativement aux coûts des crédits formels. Il est d'autre part démontré que les distributions des taux et des montants des prêts ne sont pas différentes selon la destination du prêt (consommation ou investissement), ou selon le degré de parenté des deux partenaires de la transaction.

Introduction

In West Java, home gardens (*pekarangan*) account for about 30% of the cultivated areas in places where the average demographic density reaches 800 inhabitants per square kilometre [Mary, 1986]. These home gardens include fishponds or sheepfolds and diversified associations of herbs and trees. They have long been studied extensively for their balancing role in nutrition [Ochse and Terra, 1934; Karyono, 1990] and today many scientists see home gardens as a source of substantial cash income for poor populations [Pasandaran, 1991]. This paper describes another and original role of home garden trees, that are mortgaged via an informal credit system called *gadai*. *Gadai* on rice fields has already been studied in Java by Sturgess et al. [1984] but there is

no specific study about *gadai* on trees, which is however a widespread practice in West Java, Sumatra and Sulawesi.

The objectives of the paper is to understand the mechanisms of the *gadai* system and to compare it with other forms of credit. It is an empirical contribution to the understanding of the roles of trees as savings and security for rural people. Three hypothesis are tested:

1. Are trees collateral for rural poor as suggested by Chambers and Leach [1980]?
2. Is *gadai*, as an informal credit system, more expensive than formal systems?
3. Is *gadai* a kind of solidarity system? Does it provide cheaper credit to poor families?

Methodology

The data presented here were collected in Nagrak (sub-district of Kedung Halang) a medium size rural village (7300 inhabitants in 1992) located in a periurban area, 15 km north-east of Bogor and 50 km south of Jakarta. Data concern the durian tree (*Durio zibethinus* Murr.) which is currently the most valuable tree species cultivated in this village home gardens, and generally in South-East Asia.

The survey was conducted in two stages. The first [Dury survey, 1993] addressed a random sample of 54 households representative of the village population. It was worded so as to evaluate the socio-economic conditions of villagers, to compare incomes from trees with other sources of income, and to compare the value of trees with other kinds of assets.

The second part [Vilcosqui survey, 1994] addressed all owners (258 persons) of durian trees in five hamlets of Nagrak with special attention to those who had been pawning their trees over the last five years. We asked the owner if he (or she) had currently pawned his (her) tree. Information was obtained concerning the contract characteristics, household characteristics, the nature of the relation with the lender and lender's name. Similar information was obtained from the lender, and the resulting data checked with both sources (owner-borrower and lender). It seems that no sociological or psychological impediments interfered, and high quality answers were obtained. Different types of data were collected, one set concerned 18 expired *gadai* contracts and a second set concerned 67 outstanding contracts.

In this specific village, land, home gardens and trees are privately owned and managed. No obvious collective rules interfere with the private management of assets such as trees or land. The decision unit is a household unit that comprises two parents and their unmarried children [United Nations, 1993, p. 29]. Because of recent economic growth, most of the economic transactions are now monetarized. Almost all productions are marketed and self-subsistence is neglected in the forward calculations.

The *gadai*: an informal pawning system where trees are collateral and fruit crops are the interest

Mechanism

When the owner of a durian tree (or other productive asset) needs cash, he can ask for a loan from anybody in the village in exchange for the usufruct of the productive asset until the loan is refunded. Most borrowers ask *gadai* credit directly from a friend, a relative or a durian fruit trader. In very few cases they need a middleman who charges a small fee. The loan is usually provided in cash and at the end of the contract the initial amount of the loan is refunded without extra monetary charges. The usufruct of the asset is held as interest for the loan.

The credit suppliers (lenders) argue that they follow the Koranic law that allows lenders to ask for monetary interest (share) from the borrower if, and only if, the money is invested in a productive activity. In the *gadai* case, interest is not provided in money, but rather in fruit and in this way it is in line with Koranic custom.

Duration

The duration of the loan is not specified at the beginning of the contract. Its length essentially depends on the available liquidities of the borrowers. Some contracts require a minimum number of fruit productions before the borrower may refund the money to the lender. The *gadai* loans on durian trees last up to 3 or 4 years, and are, in the rural Javanese context, the longest loans. To our knowledge, the only alternative opportunity for credit that may last more than one year is provided by the BRI (Bank Rakyat Indonesia, a national bank) and is much more complex to obtain [Dury and Lapenu, 1995].

Despite this possibility half of expired *gadai* contracts lasted for one or less than one year and only 8% of outstanding *gadai* exceeded 3 years. This feature could be correlated with the destination of credit (short-term investment or consumption). If the borrower cannot refund the loan, the tree either goes back to him after a certain period of time, or the lender takes over the property. In Nagrak, everybody seemed able to refund the durian *gadai* credit.

Durian gadai amounts

Consideration of 85 *gadai* loans on durian trees gave the following results: the mean amount was Rp 180,000,[1] with a standard deviation of Rp 160,000. The minimum was Rp 40,000 and maximum Rp 1 million. Two contrasting hypotheses can be suggested to explain how the amount of the loans is set. The first considers that the *gadai* system is not linked with other financial markets, the amount of the *gadai* being determined by the borrower's demand.

No financial considerations are made by the lender who is assumed to be altruistic. The loan is considered as a means for helping people, involving perhaps political acknowledgement or reciprocity. In this case, there is no relation between fruit production and the amount of the loan.

The second hypothesis assumes that the amount of *gadai* depends on the expected fruit production, which is likely to be well known in the village. The lender will set the level of the loan so as to be able to obtain a benefit at least as high as alternative investments. This hypothesis suggests that people have full information on financial and nonfinancial markets and are able to estimate the opportunity cost of borrowing with *gadai.*

Results of village study with respect to economic conditions

Income and property

The land-use system in Nagrak is divided into two parts. About 60% of the land are open fields planted with papaya, cassava, legumes and, to a lesser extent, rice. Production, processing and marketing of these crops account for about 45% of all incomes in the village (Dury survey). The second part of the land comprises houses, very tiny bamboo sheepfolds and many fruit trees. Net incomes from trees and animal productions which are the main outputs of home gardens represent only 7% of the overall village income (Table 1). Value added from marketing and/or processing of home garden products is relatively low compared to other marketing (papaya, cassava . . .) and transportation activities. Trees require very little work and cattle feeding is usually done by household members after their usual activities. Altogether it is estimated that home gardens provide less than 15% of incomes.

Table 1. Income distribution of a random sample of 54 households (Dury survey 1993).

Source of income		Annual Income	
		in Rp 1000	in%
Home garden production	Animals	1857	2%
	Trees (property)	4493	4%
	Trees (*gadai*)	2170	2%
	Subtotal	8520	7%
Open field production		11992	10%
Other independent activities		23977	20%
Wages		77829	64%
Financial income		111	0%
Total		122429	100%

Many other activities are not related with agriculture but are urban-linked services like transportation or trade. These activities represent about 40% of all incomes. The average annual income is estimated to be Rp 2.3 million per household. Distribution of income is very heterogeneous since 50% of households earn less than 20% of all incomes. Very low income households (less than Rp 1 million per year) are old people or farm workers.

Table 2 shows that more than 96% of all household wealth consists of nonliquid assets: farming land, houses, vehicles and building. Because of speculation and of demographic pressure, land value is very high in Java [Collier et al., 1993]. In 1993, the average land price was Rp 150 million per hectare in Nagrak. The tree value has been estimated on the basis of sale price evaluation done by farmers. People currently estimated the value of one tree as between one to two times the sale price of the annual fruit crop. Table 3 gives an idea of value range for common species. Durian tree is the most common and the most valuable specie in Nagrak home gardens. Durian fruit crop represents 75% of all home gardens' fruit productions. Durian tree property is very concentrated. Only 20% of all village households (258 out of 1089 households) own home gardens planted with durian trees. The largest durian owner possesses 16 durian trees and half of durian owners only have one single durian tree. Taking into account every kind of assets listed in Table 2, tree owners are significantly wealthier than non owners (see Table 4) as ownership of trees is usually linked to ownership of farming land. But the average income (Table 4) of tree owners does not differ significantly from average income of non-owners. There is thus no relation between asset wealth and income, mainly because people have many off-farm activities, and because land value is due to speculation, not to its productivity. People may be very

Table 2. Asset value of a random sample of 54 households (Dury survey 1993).

Assets	Kind	Value		Households concerned
		Rp 1000	%	
Productive assets	Farming lands	200402	36%	15%
	Vehicles and buildings	62301	11%	17%
	Trees	7328	1%	17%
	Animals	6130	1%	59%
Non-productive assets	Houses	269064	49%	81%
	Gold	3233	1%	19%
Cash savings	Bank	215	0%	6%
	ROSCA	2360	0%	24%
	Others	1430	0%	28%
Loans	Direct	6265	1%	19%
	Gadai	4181	1%	11%
Total		562909	100%	

Table 3. Value of most common harvested trees in Nagrak village (Dury survey 1994).

English name	Indonesian name	Latin name [De Foresta et al., 1991]	Family	Sale price range for 1 tree in Rp 1000
Clove tree	Cengkeh	*Eugenia aromatica* O.K.	Myrtaceae	2 to 50
Duku	Duku	*Lansium domesticum* Corr.	Meliaceae	50 to 100
Durian	Durian	*Durio zibethinus* Murr.	Bombacaceae	100 to 1000
Gandaria	Gandaria	*Bouea macrophylla* Griff.	Anacardiaceae	25
Common guava	Jambu batu	*Psidium guajava* L.	Myrataceae	10 to 25
Jering tree	Jengkol	*Archidendron pauciflorum* (Benth.) Nielsen	Mimosaceae	20 to 30
Coconut plam	Kelapa	*Cocs nucifera* L.	Arecaceae	30 to 100
Bauno	Kemang	*Mangifera caesia* Jack ex Wall.	Anacardiaceae	20 to 40
Horse mango	Limus	*Mangifera foetida* Lour.	Anacardiaceae	10 to 30
Common mango	Mangga	*Mangifera indica* L.	Anacardiaceae	40
Mangosteen	Manggis	*Garcinia mangostana* L.	Clusiaceae	20
Rambai	Menteng	*Baccaurea racemosa* Reinw.	Euphorbiaceae	20 to 50
Parkia	Petai	*Parkia speciosa* Hassk.	Mimosaceae	20 to 200
Rambutan	Rambutan	*Nephelium lappaceum* L.	Sapindaceae	20 to 200
Gnetum	Melinjo	*Gnetum gnemon* L.	Gnetaceae	10 to 25
Nutmeg tree	Pala	*Myristica fragrans* Houtt.	Myristicaceae	20 to 40
Jackfruit tree	Nangka	*Artocarpus heterophyllus* Lam.	Moraceae	20 to 100

Table 4. Comparison of wealth and income between fruit tree owners and the rest of the population [Dury survey, 1993].

		Tree owners	Others
Number of observations		$n_1 = 12$	$n_2 = 42$
Income	Mean (in Rp 1000)	2387	2233
	Standard deviation	1562	1841
Wealth	Mean (in Rp 1000)	$W_1 = 22488$	$W_2 = 6738$
	Standard deviation	$S_1 = 21692$	$S_2 = 14902$

Student's unilateral test for wealth: H0: $W_1 = W_2$; H1: $W_1 > W_2$; $t = 1.67$ with $\alpha = 5\%$.

$$RC = \frac{W_1 - W_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} = 2.37 > 1.67$$

RC > t, H0 is dropped.

rich in terms of asset-portfolio, but relatively poor in terms of current income flows.

Most households have several different and unsecured activities and cash shortages are very frequent. Households usually respond to this issue either by selling assets (gold or goats) or by borrowing money. The Dury survey (1993) shows that 43% of households are indebted, mainly via informal systems. The *gadai* on durian trees is one form of these informal arrangements. In 1994, one out of three durian tree owners were indebted via the *gadai* system. This system may unfortunately concern only people who own durian trees. Very poor people with no assets and low incomes cannot use *gadai*.

Characteristics of borrowers and lenders

Both borrowers and lenders are asset-wealthy. They respectively possess Rp 22.5 million and Rp 21.4 million in assets (Vilcosqui survey). There is no significant difference between them and both are representative of tree owners who possess on average Rp 22.5 million (Table 4). The annual average income of borrowers is undoubtedly lower than the annual income of lenders (Table 5), and may be lower than the average income of the

Table 5. Comparison of annual income of gadai borrowers, *gadai* lenders (Vilcosqui survey) and the whole population (Dury survey).

	Borrowers	Lenders	All households
Mean	1641	3186	2267
Standard deviation	2115	4099	1863
n	79	64	54

whole population, possibly because of the generally greater age of the borrowers.

Borrowers are relatively old people: 70% of them are more than 45 years old, whereas only 40% of lenders are more than 45 years old. Old people's resources usually decrease and there is no pension system. Moreover, in Malaysian families children usually do not support their parents [United Nations, 1993, p. 29].

Most borrowers and lenders live in the same hamlet. Only 5% of lenders and 1% of durian owners do not live in Nagrak village; 55% of contracts concern people of the same family (*Keluarga* in the Indonesian language). This feature highlights the importance of enlarged-family socio-economic links, but does not mean that credit conditions offered to family members are better than conditions offered to other people (see below).

Uses: consumption smoothing predominates

Among the 85 *Gadai* interviewed by Vilcosqui [1994], 50% used the money for immediate consumption, 12% applied the loan for durable goods (TV, fridge, house renovation, etc.) and 18% used it for investment. The other 20% borrowers used their loans for several applications. As previously mentioned, durian tree owners are often wealthy people and households who borrow through the *gadai* system also belong to middle or upper rural classes. Nevertheless, in spite of their high level of wealth, these households have to face temporary liquidity shortage because of activities that are usually insecure. *Gadai* is thus essentially used as a tool for income- and consumption-smoothing.

Biological characteristics of durian trees and calculation of interest rates

Economic calculation of interest rate depends on local characteristics of durian cultivation, on its fruiting and pricing cycles, as well as on the picking and marketing systems. Altogether these variables determine production and selling costs, selling prices, the level of risk and thus, the expected benefit that may be provided by this production.

Local conditions of durian cultivation, fruiting variations and marketing mode

Durio zibethinus Murr., the species grown by farmers in Nagrak, is usually bred from seeds from a local tree chosen by farmers. In monsoon climates, flowering takes place late in the dry season, while in humid parts of Malaysia and Indonesia, trees often flower twice a year [Prosea, 1992]. Local tradition suggests that in home gardens durian trees bear their first fruit crop 7 to 8

years after germination. From then to 13 years, the tree is said to be in its 'learning stage', producing less than 10 fruits of poor quality per year. Subsequently the annual production rises with the age of the tree and can reach up to 900 durian fruits per tree.

Fruiting variations
In Nagrak home gardens, durian trees usually produce fruits yearly, with some few durian trees producing twice a year, with 5 months in between the 2 fruiting periods; one being heavier than the other. Seasonal and climate factors may combine to produce years of exceptionally light cropping. For simplification only the global annual fruit production is considered.

Care and attention of the tree in Nagrak
Farmers look after their trees to get rid of epiphytes and trunk boring larvae. Some farmers also try to improve fruit production by applying fertilisers or animal droppings at the foot of the tree. This represents very little money and labour and is neglected in the benefit calculation.

Harvesting and marketing of durian fruits
Before the fruiting season, the tree owners sell all the expected fruit production to a trader who will then take care of all picking and marketing costs, leaving the selling price as a net benefit. One month before the fruits are ripe, pickers hired by the trader climb the tree and attach the fruit stalks with a thin rope to the branches, to keep the fruit from dropping, in order to avoid theft and damage by fruit fall. Then, when the fruit stalk no longer holds to the branch, the pickers again climb the tree to pick up the fruits. Fruit should be eaten within 2–4 days after picking since its shell splits and the ripe aril ferments. In Nagrak, the 10% to 25% of fruits that are unsold within 48 h and beginning to sour are sold at a lower price to processing industries making ice cream or fruit jelly.

The durian harvest is easily marketed by about 30 specialised traders from Nagrak who buy fruits on trees on Rp 1,000 to Rp 5,000 per fruit, depending on the fruit quality and on the season. Prices remain rather high and stable. This means that for a 'good season' a durian tree can provided from Rp 100,000 to Rp 800,000 to its owner. Fruits are carried by minibus or truck to Bogor or Jakarta where they are sold to a retailer. At the end of the marketing channel the consumer price ranges from Rp 1,500 to Rp 15,000 in the Bogor market and even more in Jakarta.

Ex post calculation of interest rates on expired contracts

Benefits from the sale of the fruit can be considered as loan interest because it belongs to the money lender during the loan period. Calculation of this implicit interest rate is similar to the calculation of the internal rate of return (IRR) on an investment. It is based on an incremental net benefit flow or 'cash

flow' schedule (Table 6). Real *ex post* interest rates were calculated on the basis of expired *gadai* contracts (see Table 6). They ranged from 0% to 210% per year. The mean and median were about 65% per year with a standard deviation of 62%. Only less than one third of the loans rates exceeded 100% per year, and informal surveys suggest that the amount of the loan is seldom less than the value of one good harvest. In financial terms, this means that interest rates do not usually exceed 100%.[2] Even so, there is still a wide range of interest rates, explainable by the production cycles of durian fruit and by different loan duration.

Table 6. Calculation of real annual interest rates of expired durian *gadai* (Vilcosqui survey 1994).

Duration	Year 1 = loan	Year 2	Year 3	Year 4	IRR
3 years	**–50**	*15*	*10*	*0* + **50**	18%
	–200	*0*	*150*	*0* + **200**	25%
	–150	*30*	*50*	*75* + **150**	32%
	–40	*15*	*30*	*40* + **40**	61%
	–100	*150*	*100*	*182* + **100**	140%
2 years	**–75**	*0*	*0* + **75**		0%
	–250	*13*	*240* + **250**		43%
	–150	*30*	*135* + **150**		48%
	–150	*125*	*188* + **150**		97%
1 year	**–100**	*0* + **100**			0%
	–150	*0* + **150**			0%
	–100	*15* + **100**			15%
	–75	*24* + **75**			32%
	–300	*120* + **300**			40%
	–100	*113* + **100**			113%
	–75	*100* + **75**			133%
	–100	*150* + **100**			150%
	–500	*1050* + **500**			210%

All figures represent Rp 1000; figures in italics represent annual crop value (interest); figures in bold represent the principal of the loan.

Uncertainty on date of refund and on production explain some variations

Suppose that a villager had lent or borrowed Rp 100,000 in 1990 for one durian tree. In 1991, the tree crop was sold for Rp 100,000, in 1992 the production was poorer and sold for Rp 50,000, finally in 1993 the production was nil (we assume that these productions represented a net benefit). In 1993 the loan was refunded. The implicit *ex post* annual interest rate is equal to 66% (see Table 7). As the fruit productions are uncertain and as the date of refund is not specified, the interest rate can differ widely for a single tree and for the same loan amount. Table 7 presents different *scenarii* and the IRR outcomes.

Table 7. Variation of annual interest rates (IRR) for *gadai* loans according to production schedule and date of refund variations.

Scenarii	Year 1 = loan	Year 2	Year 3	Year 4	IRR
Refunding after	**–100**	*100*	*50*	*0* + **100**	66%
3 years	**–100**	*0*	*100*	*50* + **100**	43%
	–100	*50*	*0*	*100* + **100**	45%
Refunding after	**–100**	*100*	*50* + **100**	0	82%
2 years	**–100**	*0*	*100* + **100**		41%
	–100	*50*	*0* + **100**		28%
Refunding after	**–100**	*100* + **100**			100%
1 year	**–100**	*0* + **100**			0%
	–100	*50* + **100**			50%

All figures represent Rp 1000; figures in italics represent annual crop value (interest); figures in bold represent the principal of the loan.

Conclusion

Production and refund date contingencies can be responsible for wide differences in *ex post* interest rates: from 0% to 100% according to our example. Nevertheless, people usually estimate the productive potential of the tree according to its size, shape and productive reputation. The amount of a loan is always close to the value of one good harvest. The previous statistics are not due to a random distribution. Observed mean and median are significant and *gadai* interest rate expectation is usually between 40% and 70%.

Does *gadai* obey market rules?

Is the gadai an usurious form of credit compared to other financial service?

Indonesia, especially West Java, is well known for the complexity of its rural financial system. Many experimental projects have been developed in addition to a successful formal system that includes local and national, commercial and development Banks [MacLeod, 1992]. Moreover, many informal institutions or traditions play a financial role by supplying credit and collecting funds. In a previous paper [Dury and Lapenu, 1995], we compared the different services (including interest rates) of these institutions. These are summarised in Table 8. Very few and limited projects offer credit that is comparable to *gadai* credit in terms of amount, duration and flexibility. These institutions are usually cooperative organisations (KUD, KUM).

By vocation, they aim at providing assistance for development purposes rather than seeking commercial profit. Their interest rates are calculated without profit and just cover working expenditure. These institutions charge

Table 8. Characteristics of Javanese credit services in the most extended institutions (from Dury and Lapenu [1995]).

	Activity	Collateral	Annual interest rate	Amount of loans (Rp 1000)	Duration	Transaction costs for rural households	
						Proximity	Impediments to entry
Retailers/traders	INFORMAL credit to consumption	Social pressure	100 to 300	5 to 50	Weeks/months	0	0
KUM, self reliance Organisation	FORMAL	Group pressure	70	50 to 300	One year	0	Limited members
Gadai	INFORMAL	Productive asset	40 to 100	100 to 200	Several months to several years	0	0
KUD, Village co-operatives	FORMAL	Group pressure and collective collateral	48	50 to 100	Several months	0	Limited number of members
PAWNING centre	FORMAL	Non productive asset	36 to 48	2 to 1500	Several months	Town	0
BKPD, Local development bank	FORMAL	Land certificate	36	100 to 20000	Month to one year	Town	Long administrative procedure
BRI-UD, National People Bank, Village Unit system.	FORMAL	Land certificate	20 to 30	25 to 25000	One year	Town	Long administrative procedure and illegal fees

Small projects, ROSCA and family loans are not taken into account.

however high interest rates (from 48% to 70% per year) because of the characteristics of the loans (small amounts, high risk level, no collateral). Thus *gadai* is not usurious as compared to similar credit services.

Finally and contrary to common opinion, there is no concentration of *gadai* credit supply since 64 different lenders were identified for 79 borrowers. More generally, the atomistic structure of the *gadai* market implies competitiveness and explain the nonusurious rates of interest.

Financial versus solidarity logic?

Lenders and many observers stress the mutual assistance motive to explain the amount of loans and their costs. If this is the case, one can assume that loans between two people of the same family (*Keluarga*) would be, on average, cheaper than loans between people of different families. Similarly according to this hypothesis a loan destined for immediate consumption needs (food, health, scholarship) would logically cost less than a loan allocated to purchase durable goods or investments.

Concerning outstanding contracts, it is not possible to specify the exact cost of the loan (interest rate). An excellent indicator would be the expected value of the benefit. Unfortunately, information on past productions (quantity and price) is heterogeneous and not suitable for calculating annual mean production (in half of the cases only two or less than two years production were known). The following simple and homogeneous indicator (IN) was thus chosen:

$$\text{IN}n = \frac{\text{Amount of loan}}{\text{Production value at year } n}$$

Assuming that production variations (quantity and price) and loan length variations are the same in both subpopulations (first case: relatives and non relatives; second case: consumption and investment), the distribution comparison is a good tool for comparison of pricing behaviour.

Comparison of these indicators for years 1990, 1991, 1992 and 1993, using the nonparametric Mann-Whitney test (Table 9) showed no significant difference between relatives and nonrelatives, or between investment and immediate consumption uses. This test also highlighted that distributions of loan amounts did not differ in both cases.

Loan amounts and interest rates are the same when a loan is contracted with related or unrelated people. Moreover it seems that lenders might be more hesitant to make loans to people belonging to the same family, as they fear longer and difficult refunding. This fear could explain the nonpreferential rates for family members.

Mutual assistance toward helpless people was not expressed in the amount or in special interest rates. The solidarity that people talk about may actually be based on the simple fact of accepting to lend money to *relatively* low

Table 9. Comparison of *gadai* amount and interest rate indicators between relatives and non relatives, and between investment and consumption uses.

Investment/immediate consumption uses

	Number of observations		T		W	Conclusion
	Consumption	Investment				
Gadai amount	54	36	1134	<	1210	H0 is accepted
IN90	38	23	511	<	569	H0 is accepted
IN91	45	30	805	<	856	H0 is accepted
IN92	49	30	762	<	929	H0 is accepted
IN93	46	28	726	<	819	H0 is accepted

Relatives/non-relatives

	Number of observations		T		W	Conclusion
	Relatives	Non relatives				
Gadai amount	48	42	1036	<	1250	H0 is accepted
IN90	33	28	466	<	597	H0 is accepted
IN91	39	36	859	<	888	H0 is accepted
IN92	40	39	888	<	979	H0 is accepted
IN93	39	35	990	>	863	H0 is rejected

As data distributions are not normal Mann-Whitney tests were used. For details about the method, see Conover [1971, pp 224–240].
T is the test statistic.
W is the value of T given by statistic table.
IN*n* = (Amount of loan)/(production value at year *n*).
H0 : distribution functions of population 1 and population 2 are similar.
H1 : distribution functions are different.
Level of significance: 5%.

income people (who, however, possess assets), or of not asking for extra charges when the loan is more risky (consumption). However, we just observed that financial markets are competitive and supposed that interest rates take into account opportunity costs for nonfinancial investments. In these conditions, the so-called solidarity does not cause lenders great hardship since they obtain statistically rather high remuneration for the loaned capital.

Conclusion

Gadai loan amounts are correlated with the expected production of the durian tree. *Ex post* calculation of interest rates shows that interest rates are not usurious: even in non-profit oriented formal financial organisations, borrowers would not find lower interest rates. On the other hand, very few alternative investments would provide such a good rate of return and security to lenders.

No preferential rates are offered to family members or to people who use the loan for immediate consumption. Determination of *gadai* loan amount and cost appears more sensitive to competitive market rules, than to any feeling of 'solidarity' between the borrowers and lenders concerned.

Acknowledgements

We are grateful to CIFOR staff members for their comments on this topic that we presented on 16 July 1994 in Bogor. We thank Professor Bungaran Saragih and the Centre for Development Studies of Bogor Agricultural University (PSP-IPB) for their administrative and scientific support during our stay in Indonesia. Iwan Komardiwan (IPB) has efficiently helped us for the data collection. Ch. Cibenel (INRA) is thanked for data processing and Danièle Mornet for language revision. We acknowledge F. Ruf from CIRAD, P. Rio and R. Lifran of the FERMAT team of the Institut National de la Recherche Agronomique (INRA) for their helpful comments. Last but not least, two anonymous referees are also very warmly thanked for the revision of an earlier version of the paper.

Notes

1. 1 US dollar = 2000 Indonesian Roupia in 1993.
2. Ruf and collaborators estimate the annual interest rate on coca plantations in Sulawesi "to be between 30% and 120% with an average of 80%" [Ruf et al., 1995, p. 359]. This figure is slightly higher than those on durian trees because financial markets may be less developed in Sulawesi and opportunity investment for lenders may also be more profitable (cocoa investment).

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