# An Asset Risk Model of Reverse Tenancy

*Marc F. Bellemare*[†] *and Christopher B. Barrett*[‡]

**VERY ROUGH FIRST DRAFT: NOT FOR CITATION**

**ABSTRACT**

Reverse tenancy, wherein poorer landlords rent out land to richer tenants on shares, is a common phenomenon. Yet, it does not fit existing theoretical models of sharecropping and has never before been modeled in the development microeconomics literature. We explain reverse tenancy contracts using an asset risk model that incorporates moral hazard. When choosing the terms of an agrarian contract, the landlord considers the impact of her choice on the probability that she will retain future rights to the rented land. Thus, this model captures the effect of tenure insecurity and property rights on agrarian contracts. The main testable implication of the theoretical model is that, as property rights become more secure, reverse tenancy tends to disappear.

[†] Corresponding Author and Graduate Student, Department of Applied Economics and Management, Cornell University, Ithaca, NY, 14853, (607) 255-1578, mfb24@cornell.edu. We thank David Just and Bart Minten for countless fruitful conversations, the participants in the Development Microeconomics Graduate Research Seminar at Cornell University for their helpful comments. The usual disclaimer applies.
[‡] Associate Professor, Department of Applied Economics and Management, Cornell University, Ithaca, NY, 14853, (607) 255-4489, cbb2@cornell.edu.

# An Asset Risk Model of Reverse Tenancy

## I. INTRODUCTION

Sharecropping, an agrarian contract by which a landlord leases out land to a tenant in exchange for a share of the crop, has long been studied by social scientists in general and by economists in particular. The canonical explanation for the existence of sharecropping, following Cheung (1969) and Stiglitz (1974), is that share tenancy matches a relatively richer landlord in a better position to absorb production risk with a tenant who, as a residual claimant on the output, has the proper incentives not to shirk. Sharecropping could thereby dominate both fixed rent contracts that were considered too risky by the tenant and wage contracts that would predictably lead to underprovision of effort by the tenant.

Of course, not every sharecropping contract fits the above stylized facts. We are especially interested in situations of "reverse tenancy", in which a relatively poorer landlord contracts with a relatively richer tenant. These situations do not fit the canonical model of sharecropping because the poorer landlord no longer holds comparative advantage in risk bearing over the tenant. None of the extant published models of sharecropping are consistent with the oft-observed phenomenon of reverse tenancy.

In this paper, we present a theoretical model of reverse tenancy as it is being practiced in Madagascar. Since the poorer landlord can neither sell her land nor exploit it herself, she

rents out to a richer tenant on a share tenancy contract. We hypothesize that imperfectly secure land rights motivate reverse tenancy. As under the canonical sharecropping model, if the landlord were to hire the tenant on a wage labor contract, moral hazard would lead to labor shirking. The innovation we introduce is that if the landlord were to rent out her land on a fixed rent contract, she would face an increased probability of losing her claim on the land. In much of rural Madagascar, local custom holds that taking possession of the fruits of the land ensures continued access to the land, much as direct cultivation of the land does under more traditional Lockean property rights. Under such conditions, the incentive to reduce asset risk motivates reverse tenancy sharecropping, replacing the traditional incentive that arises due to the landlord's superior capacity to bear yield risk.

The rest of the paper is organized as follows. In section II, we briefly review the literatures on sharecropping and on reverse tenancy. Section III, develops the theoretical model and presents the main results. In section IV, we discuss our model in relation to property rights in Madagascar. Section V concludes.

## II. REVIEW OF THE LITERATURE

### A) THE LITERATURE ON SHARECROPPING

The sharecropping literature dates back to Adam Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776, 1957), who observed that share tenancy was an unsatisfactory arrangement between slavery and the English (or fixed rent) system, that tenants had virtually no incentive to make improvements to the land under a

sharecropping contract, and that issues of moral hazard were likely to arise. It then took close to a century and a half for economists to "discover" sharecropping again. Marshall (1920), in the eighth and last edition of his *Principles of Economics*, applied a rigorous, diagrammatic, marginal analysis to the phenomenon and concluded that, given the prohibitive cost to the landlord of enforcing the tenant's effort, tenants will equate the marginal product of their labor to the marginal income they get from their share of the crop. Thus, Marshall argued that the landlord could do strictly better by signing a fixed rent contract by which she extracts the entire surplus. This kind of moral hazard is sometimes referred to as "Marshallian inefficiency".

Cheung (1968) noted that the tenant's surplus observed in a Marshallian equilibrium was inconsistent with the notion of a competitive equilibrium. He thus took a different view, assuming that the tenant's effort was costlessly enforceable. He also assumed that landlords choose the number of tenants with whom they contract, which allows the former to bind the latter to their reservation utility. Cheung (1969) then discussed without much formalism that, in presence of both agricultural risk and transaction costs, sharecropping might emerge as the dominant tenurial arrangement.

Stiglitz (1974) picks up where Cheung (1969) had left off by focusing on risk-sharing and the incentive effects of sharecropping. By exploring in turn what happens when the labor supply is inelastic and when the labor supply can vary, he obtains a series of results, two of which are striking: (i) under certain circumstances, i.e., when both parties can "mix" contracts, sharecropping becomes redundant; and (ii) under other, particular

circumstances, effort will not be underprovided, i.e., there is no Marshallian inefficiency, and sharecropping contracts are efficient.

Newbery's (1977) contribution takes Stiglitz (1974) a step further by focusing solely on the risk-sharing effects of sharecropping contracts. He demonstrates that sharecropping is irrelevant when agricultural risk is the only risk that exists, but that when another type of risk enters the picture (a plausible assumption as regards agriculture in developing countries), sharecropping becomes the dominant tenurial arrangement. Our model follows in the spirit of Newbery by introducing multiple sources of risk, in our case asset risk in addition to production yield risk.

The above key references, like the rest of the economic theoretic literature on sharecropping, cannot explain the emergence of reverse tenancy. Assuming agents do not exhibit increasing absolute risk-aversion, the conjectured dominance of sharecropping depends fundamentally on a relatively rich landlord who has a comparative advantage in risk-bearing or credit access and a relatively poorer tenant who has a comparative advantage in labor supervision due to moral hazard. Based on this, the economic theoretic literature on sharecropping inherently fails to explain reverse tenancy.[1]

**B) THE LITERATURE ON REVERSE TENANCY**

The literature on reverse tenancy is small and purely empirical, consisting almost solely of case studies. Lawry (1993) presents a case study of land tenure in Lesotho, Lyne and

[1] The reader interested in more complete reviews of the literature on sharecropping can consult Singh (1989) and Otsuka, Chuma and Hayami (1992).

Thomson (1995) review land use in KwaZulu, South Africa, and Colin and Bouquet (2001) discuss the *a medias* (or fifty-fifty) arrangement in the Mexican Sierra Madre. There is likewise scattered evidence that the phenomenon of reverse tenancy is on the rise in India (most notably Punjab and Haryana[2], but also in West Bengal) and in the Philippines (Roumasset, 2002). Two focal points seem to emerge of Lawry (1993) and Lyne and Thomson (1995): landlord households are typically headed by a single, older woman, i.e., a woman that is either divorced or widowed, and tenant households are typically headed by a younger man[3]. But none of these studies provide a sound theoretical model for or any econometric analysis of the reverse tenancy phenomenon. All of them are merely descriptive in nature.

Given the seeming frequency with which reverse tenancy occurs and the absence of any clear theory to explain its existence, there seems to be value in providing a theoretical model of reverse tenancy in order that agrarian policy on a reasonably common phenomenon might be founded on a clear understanding of the reason for the institution's existence. Such an understanding is essential if policymakers are to anticipate correctly how changes in key exogenous parameters, such as the legality of share contracts, access to rural credit, or security of land tenure, are likely responses to affect agricultural production and the welfare of poorer farmers.

Our work is motivated by field observations in Madagascar, where sharecropping was been declared illegal in the early 1970s based on the perception that it led to agreements

[2] India's *Economic and Political Weekly* has mentioned this a few times. We thank Kei Otsuka for pointing this out.
[3] The same focal points seem to be true in India. We thank Clive Bell for pointing this out.

between relatively rich landlords and relatively poor tenants, and that this in turn could lead to exploitation in the context of what Breman (1974) refers to as a patron-client relationship. Sharecropping nonetheless continues in Madagascar, comprising more than half of all land rentals, according to the most recent available data (Minten and Razafindraibe 2003). Moreover, anecdotal evidence and our own visits to numerous small farms in rural Madagascar confirm the presence of reverse tenancy and limited survey evidence suggests that landlords are, on average, less educated, poorer and more likely female than tenants. Jarosz (1991) notes that "(...) sharecroppers are not solely landless or nearly landless peasants; members of the wealthy and middle classes also sharecrop the land of others. These landowners are generally smallholders, poor or middle-class farmers who are indebted, elderly, female or the descendants of formers slaves". Jarosz also notes how people who enter sharecropping agreements are mostly married women who have inherited land near their ancestral villages and then have moved away to live near their husbands' village, divorced women, widows, etc. She also adds that poor landlords who own land will have middle-income or rich farmers as tenants, or even urban people. This is because landlords typically lack the financial or physical capital to cultivate their land themselves.

The theory that follows is thus motivated by the reasonably widespread practice of reverse tenancy in a nation where the overwhelming majority of the poor are small farmers, the poor systematically have weaker property rights in land than the rich (Randrianarisoa and Minten 2001, Minten and Razafindraibe 2003), and stimulating agricultural productivity is universally recognized as crucial to poverty reduction. One

needs a coherent theory of the phenomenon in order to answer practical policy questions such as whether a ban on share tenancy is relevant, what are the likely consequences of land tenure changes, and how might the welfare of poor land-owning households be increased?

## III. THEORETICAL MODEL

Let $h_t$ denote the landlord's land holding at time $t$, $\alpha \in [0,1-\varepsilon]$ be the share of the crop that goes to the landlord as part of the sharecropping agreement, $\beta \geq 0$ be a side payment from the richer tenant to the poorer landlord, and $\delta \in (0,1)$ be the landlord's discount factor.[4] We assume $\alpha = 1$ to be impossible, which is equivalent to assuming that the landlord cannot borrow in order to become an owner-operator and hire tenants – wage laborers – at a fixed wage. This is equivalent to assuming a fragmented credit market. In this setting, we want to know when a poorer land owner will rent out her land to a richer tenant on shares instead of a fixed rent contract. Further, we assume that the landlord cannot sell her land. This is empirically motivated by the fact that very often in Madagascar, one's ancestors are buried on one's land, and that this makes the landlord's marginal willingness to accept money in exchange for her land strictly greater than what her land could fetch on the market. That is, the presence of a landlord's ancestors on her land creates a psychic value of the land to the landlord which she would have to obtain over and above the market price in order to sell her land. Land sales are consequently uncommon and assumed away in this analysis.[5]

[4] The parameter $\varepsilon$ is a (potentially very small) positive number in the (0,1) interval included for purely technical reasons to bound the results. It is ignored hereafter.
[5] Note that we do not assume here that the market for land is fragmented.

Thus said, as regards land, we make

**ASSUMPTION 1:** Let the expected law of motion for land be such that $E(h_{t+1}) = \rho(\alpha)h_t$.

In Assumption 1, the function $\rho(\alpha)$ is an asset security parameter. Equivalently, $1-\rho(\alpha)$ is the risk of asset loss due to tenure insecurity in the land. Small farmers in several different sites in rural Madagascar have told us over the past decade that if their claim to a parcel of land is at all insecure, in the sense that it could be repossessed by the community and given to a different farmer, then their customary claim to the land is enhanced if they are observed to receive and retain part of the crop from the parcel. This seems to reflect either some sense of the household's dependence on the parcel for its food security – and communities are loathe to damage members' food security – or a quasi-Lockean property right, wherein receiving the fruit of the land is treated similarly to working it directly. The origin and motive of this perception are not the object of our study. We take these as given. We therefore make:

**ASSUMPTION 2:** Let $\rho'(\alpha) > 0$, i.e., asset security (risk) is strictly increasing (decreasing) in the share of the output received as rent.

We then make

**ASSUMPTION 3:** Let the landlord's utility function $u(\pi_t)$ be a bounded, strictly increasing, strictly concave and twice continuously differentiable function of profit at time $t$, $\pi_t$.

The concavity assumption implies that the landlord is risk-averse. The sharecropping literature typically assumes that the landlord is risk-neutral and the tenant risk-averse. Given that the landlord is poorer than her tenant in situations of reverse tenancy, it seems reasonable to assume that the landlord is indeed risk-averse.

The landlord's profit at time $t$ is a function of land, such that:

$$u(\pi_t) = u[\alpha_t f(k_t, \ell_t, h_t) + \beta_t - c_t], \tag{3}$$

where $f(k_t, \ell_t, h_t)$ is the agricultural output as a function of capital, labor and land at time $t$, respectively, such that $f'(\cdot) > 0$, $f''(\cdot) < 0$ and $f(\cdot)$ is bounded. The parameter $\beta_t$ is the side payment – the fixed rent if it is positive or, if negative, a cash wage– from the tenant to the landlord; and $c_t \geq 0$ subsumes the various costs borne by the landlord. For simplicity, we assume that the landlord possesses no input other than land, i.e., the tenant possesses both capital and labor inputs, as seems typical from the extant literature. In order for the reverse tenancy sharecropping contract to be individually rational, the

landlord must derive non-negative profit from the agreement. Further, in order to account for moral hazard[6], we make

**ASSUMPTION 4:** Let $\ell_t = \ell(\alpha_t)$, where $\ell'(\cdot) < 0$ and $\ell''(\cdot) > 0$. That is, there is Marshallian inefficiency.

Note that for simplicity, we only assume traditional moral hazard instead of assuming both traditional and technical moral hazard.[7] This does not make much difference, as our main results would only be strengthened by assuming both traditional and technical moral hazard.

Thus, the landlord's problem is to

$$\max_{\{\alpha,\beta\}_{t=0}^{\infty}} E_t \sum_{t=0}^{\infty} \delta^t u(\pi_t) \qquad \text{s.t. } E(h_{t+1}) = \rho(\alpha) h_t \text{ and } h_0 > 0 \text{ given.} \qquad (4)$$

The Bellman equation for equation (4), or its dynamic programming version, is such that:

$$V(h) = \max\{u(\pi) + \delta E V(h')\} \qquad \text{s.t. } E(h') = \rho(\alpha) h \text{ and } h > 0 \text{ given.} \qquad (5)$$

[6] Sadoulet, de Janvry and Fukui (1997) find that moral hazard plays much less of a role in kin contracts than in non-kin contracts. There is survey evidence that as much as 40 percent of sharecropping contracts are kin-based in Madagascar, and we intend to test for this in our upcoming research. Finding strong evidence that moral hazard indeed has no effect in kin-based sharecropping agreements would point to the need for a different theoretical model, or a different formulation of the present one.

[7] Traditional moral hazard refers to situations where the agent underprovides labor or, more generally, effort. Technical moral hazard refers to situations where the agent underprovides capital or chooses a production technique which is not optimal from the principal's point of view.

We drop the subscript in equation (5) given that the sequential problem is reduced to only two periods – now and tomorrow – by the principle of optimality. Thus, $h$ denotes the landlord's land now and $h'$ denotes the landlord's land in the future.

Let us now assume that the landlord's utility function – or returns function, in dynamic programming terms – takes the canonical DARA/CRRA form:

**ASSUMPTION 5:** Let $u(\pi_t) = \ln \pi_t = \ln[\alpha_t f(k_t, \ell(\alpha_t), h_t) + \beta_t - c_t]$.

Given that the landlord's profit is bounded by assumption,[8] the function $u(\cdot)$ is also bounded, and it is continuous, strictly increasing, strictly concave and twice continuously differentiable. Thus, the landlord's dynamic programming problem is:

$$V(h) = \max_{\alpha,\beta} \{\ln[\alpha f(k, \ell(\alpha), h) + \beta - c] + \delta E V(h')\}$$

$$\text{s.t. } E(h') = \rho(\alpha)h\,,\ h > 0\,. \qquad (6)$$

At this point, note that because $\beta$ enters the landlord's profit linearly, by strict monotonicity of her preferences, she will always set $\beta$ at the highest possible value, while still satisfying the tenant's individual rationality constraint, which we omit here in the interest of brevity.[9] Thus, we make:

[8] Assuming that the agricultural output is bounded, then the landlord's profit is bounded.

[9] We use a principal-agent formulation here for the sake of simplicity and consistency with the extant sharecropping literature. As Bell (1989) notes, it is likely that tenants also enjoy welfare gains from sharecropping contracts. The intuition and qualitative results of our model carry over to the more complex bargaining theoretic framework necessary to derive mutual gains from sharecropping

**ASSUMPTION 6:** Let $\beta = \beta(\alpha)$, where $\beta'(\cdot) < 0$ and $|\beta'(\alpha)| < f(k, \ell(\alpha), h)$. That is, the rent paid to the landlord is a strictly decreasing function of the share of the crop and never exceeds the value of the crop.

Then, the problem can be reduced to:

$$V(h) = \max_{\alpha} \{\ln[\alpha f(k, \ell(\alpha), h) + \beta(\alpha) - c] + \delta EV(h')\}$$

$$\text{s.t. } E(h') = \rho(\alpha)h, \; h > 0. \qquad (7)$$

The first-order condition for equation (7) implies that under the optimal contract:

$$\frac{f(k, \ell(\alpha^*), h) + \alpha^* f'(k, \ell(\alpha^*), h)\ell'(\alpha^*) + \beta'(\alpha^*)}{\alpha^* f(k, \ell(\alpha^*), h) + \beta(\alpha^*) - c} = -\delta EV'(h') \cdot \rho'(\alpha^*)h \qquad (8)$$

In light of the assumptions we have made thus far, the value function is strictly increasing. Consequently, the value of owning a plot of size $h$ for a landlord who behaves optimally from now on is strictly increasing in the amount of land owned. More importantly, it establishes that the right-hand side of equation (8) is strictly negative. Further, equation (8) immediately allows us to state the following:

**PROPOSITION 1:** Under Assumptions 1, 2, 3, 4, 5 and 6, sharecropping emerges as the optimal contract. That is, $\alpha^* > 0$ and $\beta = \beta(\alpha^*)$ is set so as to

maximize the landlord's profit from the contract while maintaining the tenant at his reservation level of utility.

**PROOF:** *Suppose not, i.e., suppose* $\alpha = 0$. *Then, evaluating equation (8) at* $\alpha = 0$ *yields*

$$\frac{f(k,\ell(0),h) + \beta'(0)}{\beta(0) - c} = -\delta EV'(h') \cdot \rho'(0)h$$

$$\Rightarrow \qquad -\frac{f(k,\ell(0),h) + \beta'(0)}{\delta EV'(h') \cdot \rho'(0)h} = \beta(0) - c$$

*But then, the left-hand since of this last equation is negative given the latter part of Assumption 6 and since* $f(k,\ell(0),h) > 0$ *and* $\delta EV'(h') \cdot \rho'(0)h > 0$, *this yields a contradiction since whenever* $\alpha = 0$, *the landlord's profit is equal to* $\beta(0) - c$, *which must be non-negative by individual rationality. Alternatively, evaluating the first-order condition at* $\alpha = 0$ *yields a positive value and a necessary condition for a maximum is that the value of the first-order condition be nonpositive. Thus, at the optimum,* $\alpha > 0$.

We can also state the following as regards the comparative statics of the model, which gives us empirically-testable implications:

**PROPOSITION 2:** The share of the crop that goes to the landlord is strictly increasing in the cost borne by the landlord and strictly decreasing in the amount of capital provided by the tenant. Also, the output is

decreasing in the crop share. That is, $\frac{\partial \alpha}{\partial c} > 0, \frac{\partial \alpha}{\partial k} < 0$, and $\frac{\partial f}{\partial \alpha} < 0$.

**PROOF:** *We prove this directly using the partial derivatives of* $\alpha$ *with respect to c and k:*

$$\frac{\partial \alpha}{\partial c} = \frac{\delta EV'(h')\rho'(\alpha)h}{f(k,\ell(\alpha),h)\delta EV'(h')\rho'(\alpha)h + f'(k,\ell(\alpha),h)\ell'(\alpha)} > 0 \quad (9)$$

$$\frac{\partial \alpha}{\partial k} = \frac{-f'(k,\ell(\alpha),h) - [f'(k,\ell(\alpha),h)\delta EV'(h')\rho'(\alpha)h + f''(k,\ell(\alpha),h)\ell'(\alpha)]}{[f(k,\ell(\alpha),h)\delta EV'(h')\rho'(\alpha)h + f'(k,\ell(\alpha),h)\ell'(\alpha)]^2} < 0 \quad (10)$$

*While the sign of equation (10) is unambiguous, the denominator of equation (9) is of ambiguous sign given that its second term is negative. But then, the second term multiplies two marginal effects, i.e. its value will be very small compared to the first term. Thus, equation (9) is positive. Finally,*

$$\frac{\partial f}{\partial \alpha} = f'(k,\ell(\alpha),h)\ell'(\alpha) < 0 . \quad (11)$$

This model hinges on the existence of insecure land rights. This implies that tenure security will affect the existence of reverse tenancy contracts. This leads to

**PROPOSITION 3:** As property rights become secure, the landlord will switch from a reverse tenancy agreement to a fixed rent contract. That is, when $\rho(\alpha) = 1,\ \alpha = 0$.

**PROOF:** *This is simply a Newbery-type result: when there exists only one type of risk, in this case moral hazard, then sharecropping agreements become irrelevant. To see this, note that if* $\rho(\alpha) = 1$*, then a risk-averse landlord does strictly better by leaving all of the crop to the tenant and extracting the whole surplus by setting* $\beta(\alpha) = \beta(0)$ *at the value which will maximize her profit while maintaining the tenant at his reservation level of utility.*

In sum, Proposition 1 establishes the emergence of reverse tenancy, i.e., that sharecropping between a poorer landlord and a richer tenant can emerges as the dominant tenurial arrangement. Proposition 2 provides the main empirically testable implications of our theoretical model in the presence of cross-sectional data among a population characterized by reverse tenancy sharecropping. Proposition 3 establishes that as property rights get stronger, reverse tenancy sharecropping tends to disappear, providing a key empirically testable proposition that will require longitudinal data for proper testing.

## IV. DISCUSSION

Given the model of the preceding section, it appears that reverse tenancy sharecropping contracts, which are still illegal in Madagascar, emerge from the joint presence of asset risk and moral hazard. In so far as sharecropping's illegality impedes reverse tenancy contracting, the legal restriction therefore injures poor, landed households by inducing them to choose a suboptimal form of contracting out their land. Furthermore, as property rights become more secure, reverse tenancy sharecropping will tend to disappear, with poorer land owners benefiting from reduced Marshallian inefficiency as a result of

endogenously changing agrarian contracts. Thus, there seems to be a good reason for the State to address the issues of sharecropping, titling and property rights enforcement.

The relevance of property rights questions is made greater by empirical evidence that poor landowners may be most affected by insecure property rights. To wit, Randrianarisoa and Minten (2001) mention that in 1993, although 31% of owned land was reported as titled, the breakdown in income quintiles indicated that this percentage was equal to 32% for the richest quintile but was only equal to 20% for the poorest quintile. Minten and Razafindraibe (2003) note that this inequity becomes more acute when one looks at gender differences, with land more than three times more likely to be titled in a man's name than in a woman's. Poor and female landowners thus appear to be the ones whose property rights are the weakest, and so they are the ones who could most benefit from a strengthening of property rights. Randrianarisoa and Minten (2001) also mention that "while an improvement of secure property rights that can be established in a cheap way might benefit agricultural productivity and efficiency in some regional settings, increasing attention should be paid to include the poor in this titling process. It is shown that the rich hold relatively more secure titles to land than do the poor and some studies have shown that the rich might even get titles to the detriment of the poor."

In this sense, if property rights are endogenous, as we have argued, an effort should be made to make them exogenous. Besley (1995), studying the link between land rights and individual investment decisions in Ghana, similarly argued that property rights could be endogenous but he concluded that one should not necessarily see developing land rights

as a universal panacea. Platteau (1996) also argues that the beneficial effects of establishing private property rights are overestimated, and that it would be better to rely on informal mechanisms at the community level. Our model, however, introduces the important possibility of endogenous change in the form of contract governing agricultural production. In this setting, it appears that establishing such rights may well improve the situation of poor but landed households.

## V. CONCLUSION

This paper introduces a theory to explain the existence of reverse tenancy, i.e., sharecropping agreements in which the landlord is poorer than the tenant. Reverse tenancy has been widely reported in the empirical literature, but no theoretical explanation of its origins has been advanced to date. Using a dynamic argument which combines the risk of asset loss with Marshallian inefficiency associated with labor shirking by an imperfectly supervised tenant, we establish that sharecropping contracts will be chosen by the poorer landlord and derive comparative statics that are consistent with the stylized facts of reverse tenancy sharecropping. Our model also implies that reverse tenancy will tend to disappear as property rights get stronger. First, the State should make sharecropping contracts legal, for even though the ban on share tenancy is not strictly enforced, it still creates some uncertainty for the households that are party to such agreements. Second, the State should address the question of land rights for all land owners, perhaps especially the poor.

While this model explains the stylized facts well enough, there is still much to be done on reverse tenancy. For one, our model should be taken to data and tested against other plausible explanations for the existence of reverse tenancy. For example, Bellemare (2003) offers a preliminary model of reverse tenancy based on limited liability. Given apparent widespread practice of reverse tenancy in different legal, political and economic environments, a general explanation of this phenomenon based on sound theory and empirical validation should be sought.

**REFERENCES**

BELL, Clive (1989), "A Comparison of Principal-Agent and Bargaining Solutions: The Case of Tenancy Contracts" in Pranab Bardhan, ed., *The Economic Theory of Agrarian Institutions*, Oxford: Oxford University Press.

BELLEMARE, Marc F. (2003), "A Limited Liability Model of Reverse Tenancy", Working Paper, Department of Applied Economics and Management, Cornell University.

BESLEY, Timothy (1995), "Property Rights and Investment Incentives: Theory and Evidence from Ghana", *Journal of Political Economy*, Volume 103, Issue 5, pages 903-937.

BREMAN, Jan (1974), *Patronage and Exploitation*, Berkeley, CA: University of California Press.

CHEUNG, Steven N.S. (1968), "Private Property Rights and Sharecropping", *Journal of Political Economy*, Volume 76, Issue 6, pages 1107-1122.

CHEUNG, Steven N.S. (1969), *The Theory of Share Tenanc*y, Chicago: The University of Chicago Press.

COLIN, Jean-Philippe and Emmanuelle BOUQUET (2001), "Le métayage comme partenariat: L'arrangement *a medias* dans la Sierra Madre orientale – Mexique", *Économie Rurale*, January-February, pages 77-92.

JAROSZ, Lucy A. (1991), "Women as Rice Sharecroppers in Madagascar", *Society and Natural Resources*, Volume 4, pages 53-63.

LAWRY, Steven (1993), "Transactions in Cropland Held Under Customary Tenure in Lesotho", in Thomas J. Bassett and Donald E. Crummey, eds., *Land in African Agrarian Systems*, Madison: University of Wisconsin Press.

LYNE, Michael C. and David N. THOMSON (199?), "Creating Opportunities for Farmers in Communal Areas: Adapting Institutions to Promote an Efficient Rental Market in Arable Land", unpublished Ph.D. dissertation, University of Natal.

MARSHALL, Alfred (1920), *Principles of Economics, 8th ed.*, London: Macmillan and Co. Ltd.

MINTEN, BART AND ROLLAND RAZAFINDRAIBE (2003), "Relations Terres Agricoles – Pauvreté à Madagascar," Policy Brief 1.5 presented at Projet Ilo/FOFIFA conference on Agriculture and Poverty, Antananarivo, March 2003.

NEWBERY, David M.G. (1977), "Risk-Sharing, Sharecropping and Uncertain Labour Markets", *Review of Economic Studies*, Volume 44, Issue 3, pages 585-594.

OTSUKA, Keijiro, Hiroyuki CHUMA and Yujiro HAYAMI (1992), "Land and Labor Contracts in Agrarian Economies: Theories and Facts", Journal of Economic Literature, Volume 30, Issue 4, pages 1965-2018.

PLATTEAU, Jean-Philippe (1996), "The Evolutionary Theory of Land Rights as Applied to Sub-Saharan Africa: A Critical Assessment", *Development and Change*, Volume 27, pages 29-86.

RANDRIANARISOA, Jean-Claude and Bart MINTEN (2001), "Agricultural Production, Agricultural Land and Rural Poverty in Madagascar", Working Paper #112, Ithaca, NY: Cornell Nutrition and Food Policy Program.

ROUMASSET, James A. (2002), "The Microeconomics of Agricultural Development in the Philippines", Working Paper 02-10, University of Hawaii.

SADOULET, Elisabeth, Alain DE JANVRY and Seiichi FUKUI, "The Meaning of Kinship in Sharecropping Contracts", *American Journal of Agricultural Economics*, Volume 79, Issue 2, pages 394-406.

SINGH, Nirvikar (1989), "Theories of Sharecropping" in Pranab Bardhan, ed., *The Economic Theory of Agrarian Institutions*, Oxford: Oxford University Press.

SMITH, Adam (1776), *An Inquiry into the Nature and Causes of the Wealth of Nation*s, Chicago: The University of Chicago Press.

STIGLITZ, Joseph E. (1974), "Incentives and Risk-Sharing in Sharecropping", *Review of Economic Studies*, Volume 41, Issue 2, pages 219-255.