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## **RISK, SCARCITY AND LAND MARKET: THE UNEVEN ECONOMICS OF INDUCED INSTITUTIONAL CHANGE IN THE WEST AFRICAN SAHEL**

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**RISK, SCARCITY AND THE LAND MARKET:  
THE UNEVEN ECONOMICS OF INDUCED INSTITUTIONAL CHANGE IN THE  
WEST AFRICAN SAHEL**

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## Abstract

This paper theoretically shows that land scarcity by itself is insufficient to induce the emergence of an active land market in a relatively egalitarian agrarian economy. However, when risk-coping is individualized, and when risk-coping capacity varies across individuals, there are incentives to create a land market in the sense that individuals would be willing to pay significantly for its creation. In contemporary West Africa, where formal financial markets are unlikely for a host of informational reasons to replace the social sharing of the dissolving customary social order, the interplay between land scarcity and risk seems likely to drive the endogenous emergence of the land market and to provide the basis for its operation.

The analysis further identifies two distinct classes of interest which underlie this demand for a land market. First, those agents whose meager endowments makes them likely to appear on the supply side of the land market are willing to pay for the land market as a device to help smooth their consumption. The fact that these at-risk agents exist as potentially willing sellers, simultaneously induces a value to the land market to the better endowed agents who can afford to both manage risk and invest in land as a scarce, productive asset. The endogenous emergence of a land market thus requires this interplay between land scarcity and differential risk coping. When born of such disparate class interests, systematically related to endowment and wealth, the land market and its *modus operandi* merit serious attention.

This perspective on the interacting yet distinct interests which may endogenously induce a land market is highly suggestive of the way a land market may work under these circumstances. Simulation analyses carried out in a companion paper (Carter and Zimmerman 1993) bear out this suggestion as a relatively egalitarian initial endowment distribution tends to pull apart over time as agents optimize and interact through the land market. Ultimately, the policy implications of this perspective is not that land markets are in some sense "bad" (for their existence improves the intertemporal welfare of the poor), but that priority must be given to finding incentive compatible substitutes for the risk management functions of the traditional compound lest the agrarian economy set off on a trajectory of dubious social desirability.

**Risk, Scarcity and the Land Market:  
The Uneven Economics of Induced Institutional Change in the West African Sahel**

Among the myriad of challenges facing West Africa on its path to agricultural development, the intractable social animosities and economic rigidities of a very unequal distribution of land have been largely absent. As it further develops economically, will West African agriculture retain its egalitarian character; or, will it travel down a path of unequal land access and uneven development similar to that seen in parts of Asia and Latin America? The answer to this question depends fundamentally on the future development of land markets in West Africa, and on how they will operate.

There is a common (though by no means universal) perception among those who write about West Africa that agricultural land is fundamentally inalienable: that prevailing social norms allow it to be lent, borrowed, or bequeathed, but never bought, sold, or rented. It will be argued here, however, that these social norms--and Africa's rural equality--are intimately tied to Africa's historical abundance of land. As land becomes scarcer, however, and as it acquires more of an economic value, institutions may arise that restrict access to land, that vest rights increasingly in individuals, and that may even engender an active land market.<sup>1</sup>

The development of land markets, however, depends not just on a high shadow price for land (i.e., on land scarcity), but also on *differences* in shadow prices across agents. This difference may be due to life-cycle effects, to differential productivities of land attributable to differences in farmer training, age or credit-access, or to sudden shocks to current consumption due to unmediable production risk. This paper argues that differences in risk-coping ability, and greater individual exposure to risk constitute a powerful economic force for the development of land markets in the low-input, risky agricultural environment of the West African Sahel. Without such differences in risk

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<sup>1</sup> Feeney (1985), for example, applied this North-like interpretation to the development of land markets in Africa.

coping (as, for example, when risk is insured through customary risk management devices), there is in fact much less economic value to a land market, even when land is scarce. This paper is thus designed to take the first step toward understanding how land markets will work by understanding when and why they endogenously emerge. At a policy level, this paper, and its companion analysis of the evolution of agrarian structure in West Africa (Carter and Zimmerman 1993), motivate attention to the risk management devices which might compensate for the dissolving customary institutions and the notoriously thin or absent capital and insurance markets in the region.

The remainder of this paper is organized as follows. Section 1 describes the customary environment and institutions of the Sahel as being those of a subsistence economy, based on the large compound, isolated by poor infrastructure from the rest of the world, characterized by limited consumption opportunities and equality of wealth. The three pillars of this production/consumption system were: (1) The compound, which pooled labor for at least a part of production, sheltered its members from environmental and personal risk, and helped smooth over demographic and life-cycle transitions; (2) The universal, subsistence-level standard of living, prescribed by the lack of available luxuries, foreign curiosities or efficiency-enhancing technologies; and, (3) The open land frontier.

As described in Section 2, all of these pillars would be kicked away with the coming of the Europeans and subsequent developments. New manufactured products would provide an incentive for materially-based social differentiation, and hence for material accumulation. New head taxes, paid by the compound head, put pressure on the compounds, which lead to their fracturing into smaller units, less able to insure themselves against risk. Meanwhile, market opportunities for some, including work in the new cities, provided them with a new alternative to reciprocity-based risk-coping, and enabled them to withdraw from the traditional compounds. Freed of the necessity to participate in the compounds for the economic needs it served, they freed themselves of its strictures and economic responsibilities. Finally, increasing population pressure has begun to remove the third pillar of land abundance.

Section 3 then discusses the effects of these changes for the value and use of land as an asset. In particular, if the social sharing schemes, which were once embedded in the traditional compound structure, lose their incentive-compatibility, unmediated risk has the capacity to put individual households at below subsistence levels. These households, even if they optimally manage private grain stocks, may find themselves up against a biological constraint that demands that they boost consumption, or face seriously impaired health and labor power, or even death. In these circumstances, these household will logically turn to land as an asset which can be alienated to cover subsistence. Using a dynamic stochastic programming model, a compensating variation calculation reveals a positive willingness to pay for a land market on the part of those agents whose endowments most likely puts them on the supplying side of the land market. The fact that these at-risk agents exist as potentially willing sellers, simultaneously induces a value to the land market to the better endowed agents who can afford to both manage risk and invest in land as a scarce, productive asset. The endogenous emergence of a land market thus requires this interplay between land scarcity and differential risk coping. When born of such disparate class interests, the land market and its *modus operandi* merit serious attention.

As a final introductory comment, it might be noted that while this paper thus examines the economic rationale behind social and economic institutions and norms<sup>2</sup>, its emphasis on economic factors in explaining social change is not meant to imply a functionalist or materialist world view. Instead it reflects a desire to understand quite rigorously the impact of material forces and interests on institutional preferences, an impact which plays its part in the broader drama of institutional change. For the duration of the present work, peasants are assumed to maximize utility over time, but are

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<sup>2</sup>This is the approach taken by materialist anthropologists, and by evolutionary economists. For a description and justification, see Mitchell (1989) for an anthropologist's perspective, and, for the view of economists, see Binmore and Samuelson (1993).

constrained by imperfections in the markets in which they interact, and so evolve dynamic social customs to assist the functioning of the imperfect markets<sup>3</sup>.

### **Section 1      Environmental Constraints of Agricultural Production in the Semi-Arid West African Tropics and Economic Institutions.**

The African Sahel consists of the sparsely forested grasslands that extend from Mauritania to Sudan just south of the Sahara desert. The soil fertile varies, but rainfall is insufficient to afford a dense population base (Matlon 1987). The area is peopled by nomadic herders and farmers who until quite recently have practiced itinerant swidden agriculture. Notwithstanding large cities (Sokoto, Kano, Ségou) and important trading routes (both north-south and east-west), the sparseness of inhabitation and the shifting nature of settlement had for centuries meant that roads and other social and economic infrastructure were costly and unattractive to build and maintain. This lack of infrastructure heightened the relative isolation of rural villages.

These material conditions of existence had a number of economic implications (Binswanger, McIntire and Udry 1987). First, because of the comparatively open land frontier, sparse population and poor infrastructure, there would be no political authority with sufficient breadth, coercive power and incentive to enforce economic contracts. Economic exchanges therefore would have to depend on their own endogenous logic to remain viable. Second, and related, an open land frontier provides the opportunity for peasants to engage in autonomous cultivation rather than wage labor. Third, production was pursued in an extensive, rather than intensive fashion, using manual labor and few purchased inputs. Accordingly, labor hiring arrangements—to the extent that these exist—would take the form of reciprocal labor exchange, rather than that of a capital-rich household hiring capital-poor workers. Finally, the paucity of trade opportunities implies that there would be little opportunity for non-agricultural consumption, so that whatever productivity improvements come along would be

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<sup>3</sup>The approach taken is something like that of the neo-institutionalists, with their interest in induced institutional innovation. But where they are often interested in how changing economic conditions can cause new and virtuous institutional forms to arise, we will be interested in part in how changing economic conditions cause old and virtuous institutional forms to disappear.

taken as leisure rather than increased consumption of foodstuffs. Production would therefore tend toward a subsistence character, and the study of customary Sahelian agriculture is accordingly the study of a low-input, autonomous, subsistence agriculture. What sort of institutions evolved to perpetuate the social groups occupying this environment?

### 1.1 *Household Organization.*

The subsistence economy was organized into large compound groups both for the purposes of production and consumption. These compounds could count as many as 80-100 people, or could be considerably smaller, depending on local conditions (Savonnet 1976; Capron 1973). They are composed of the compound head, his wives, his younger brothers, their wives, his sons, their wives, sundry unmarried children, and sometimes an aged relation. In some areas of the Sahel, all production was customarily undertaken communally, while in other areas, the compound was only a loose affiliation with perhaps just one large field benefitting from communal labor. Similarly, consumption was undertaken communally, as an entire compound or severally, with each of the adult women cooking for her own children and husband.

It is useful to think of a compound as being composed of several households, each of which assured its own production and kept its separate granary. One compound might count as few as one household, or as many as there were married men—sometimes six or eight. Even where one could identify several distinct households within a compound, however, by no means were these individual households economically isolated from the other households in the compound. During times of trouble, in particular, all households shared equally from their separate granaries, and the compound head had ultimate control over all granary management. On the production side, labor-sharing was common, and again, the compound head had ultimate control over the allocation of all productive resources. Apart from small amounts allocated to personal discretionary needs, the separation of the compound into constituent households was more a matter of personal taste and practicality than a reflection of any real economic division (Capron 1973).

Beyond the compound itself, members were tied to other compounds by means of lineage relationships (Vierich 1986; Matlon and Vierich 1982; Golan 1990; Platteau 1988). Across compounds within a lineage there was some labor sharing and some sharing of food, especially in times of need, though not as much as within the compound. Indeed, it is useful for our purposes to think of the compound and lineage as constituting social sharing networks to cope with risky production outcomes. These networks function by pooling large amounts of different risks. The size of the lineage was of course a demographic variable, but the size of the compound was at least partly economic.

The existence of the compound as an economic unit was tied to its three main economic advantages: first, it functioned as an efficient insurance scheme. Second, it allowed compound members to take advantage of important economies of scale in labor use. Agricultural labor, there as elsewhere was rendered more pleasant and interesting when done by many people, so that work in groups increased efficiency, or at least reduced its perceived drudgery (Baudoin 1975). Finally, large compounds can smooth out the differences across households in the ratio of productive to nonproductive household members, thereby making the reproduction of households smoother and more efficient (Van der Klei 1978).

The large compound was therefore a defining feature of customary agricultural production. Like a medieval manor, it was a nearly self-contained economic unit that filled many economic needs: it provided for production—both communal and individual; collective and individual consumption; social security insurance against both penury and old age; and reciprocal child-care and education. A transition to a market economy is therefore a transition from the provision of most (if not all) economic needs by the institutions of the family compound to the provision of those needs by insurance, credit, and labor markets.

## 1.2 Risk and Risk-Coping.

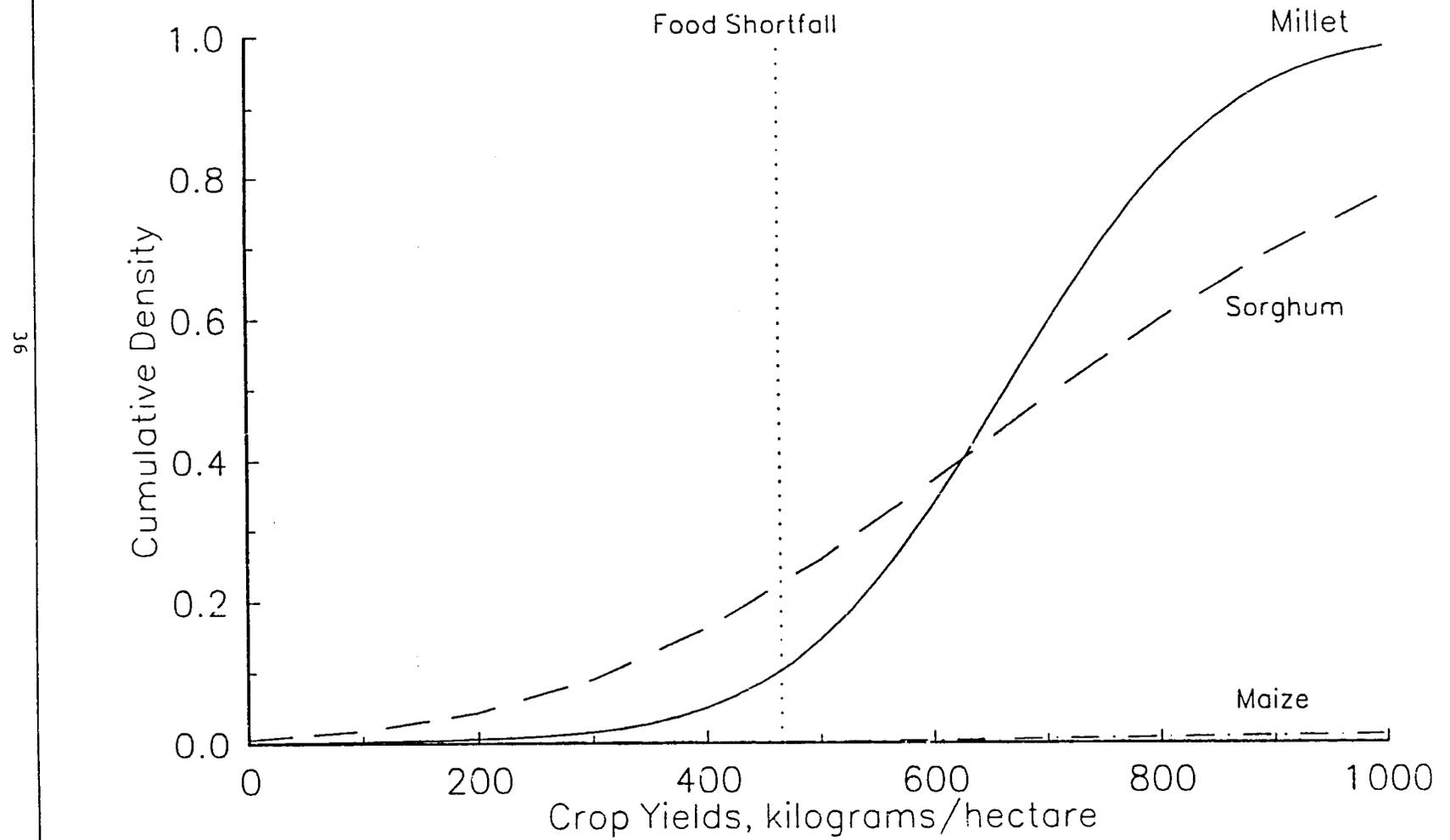
As seen above, one of the chief functions of the large compound was that of insurance against poor harvests. The importance of this role cannot be overstated, as one of the most salient features of agricultural production in the Sahel is the constant and menacing presence of environmental risk. Poor soils, meager average and highly variable rainfall levels conspire to create a risky agricultural environment in the West African semi-arid tropics.

Environmental instability can be decomposed into inter-temporal (year-to-year) and intra-annual (microclimatic) variations. These two components give rise to what is commonly called *covariate* and *specific* risks. Figure 1 (taken from Carter 1991b) displays a measure of these two forms of risk for the central (sub-sahelian) zone of Burkina Faso. The plotted cumulative density functions show the probability that grain yields per-hectare will fall below the amounts shown on the horizontal axis. The dashed vertical line in Figure 1 shows the grain yields which are necessary on average to assure bare physical subsistence given current population density (consumer equivalents per-cultivated hectare) in the zone. As can be seen, in this agro-ecological environment, a household monocropping millet on a single field would face a 14% probability of a production shortfall, while the equivalent risk for sorghum would be 19%.

Obviously any unit actually exposed year-to-year to starvation risks of this magnitude would not persist for long. The compound structure is one of the principle ways households manage this risk. By banding together in a compound, households can spread out and attenuate their effective exposure to specific risk, while at the same time having access throughout the life-cycle to the savings necessary to protect them from intertemporal risk. The other principle means which individual households have traditionally used to manage risk include plot-scattering and crop-mixing. Here environmental variability is used to diversify production to obtain a more stable average yield.

There is a tendency in the literature to divide those devices into *self-insurance* and *reciprocity* (or moral economy) devices (see the review and discussion in Platteau 1990). This bifurcation is misleading. What are labelled self-insurance devices (e.g., field scattering, variety diversification) are

Figure 1: Yield Risk in the Transition Zone



often endowment-dependent, meaning that access to particular kinds of land or other endowments are necessary to use them. *Conditional Self-Insurance* is a better term to denote these kind of risk management devices.

It is also misleading to describe the social reciprocity schemes of the compound or lineage as solely or exclusively dependent on moral economy or other norms for their functioning. In the risky environment of the Sahel, it may be that social sharing schemes are both collectively and individually rational. (Coate and Ravallion 1993; See also Binmore and Samuelson (1993) for an interesting discussion of the endogenous evolution of social norms.)

Table 1  
Conditional Self-Insurance and Exogenously Enforced Reciprocity

	SAHEL			CENTRAL BURKINA		
	Exp yield kg/cons.	Disast. Prob. %	Cert. Grain Equiv kg <sup>1</sup>	Exp yield kg/cons.	Disast. Prob. %	Cert. Grain Equiv kg <sup>1</sup>
<u>Monocrop</u> <sup>2</sup>	340	26	230	311	19	266
<u>Self-Insurance</u>						
Mix Variety	290	32	191	300	14	272
Scatter Field	340	21	269	311	15	288
Mix + Scatter	290	28	212	300	10	299
Observed <sup>3</sup>	333	23	270	310	4.5	299
<u>Reciprocity</u> <sup>4</sup>	366	13	299	338	0.4	330

Source: Carter (1991b)

Notes

1. The Certain Grain Equivalent is the amount of grain (in kilograms per consumer) which, if guaranteed with certainty, would yield the same expected utility as the risky prospect for a moderately risk averse consumer with a relative risk aversion equal to one.
2. The monocrop counterfactual for the Sahel is a single large field of millet; for the central region, sorghum.
3. The "Observed" self-insurance practice reflects the actual behavior of an average sample. In both regions, the average household cultivates several scattered fields of millet and sorghum plus a small household plot of maize.
4. Reciprocity defined as a network of five average families plus one compound head who cultivates additional area. All network members are assumed willing to completely pool income.

Both reciprocity (social sharing) and conditional self-insurance schemes are embedded within the institutional or property rights structure of the still fairly traditional agrarian societies of the Sahel. Conditional self-insurance exists in the form of property rights schemes which guarantee society members access to the quantities and qualities of land necessary to mix crops and scatter fields across microenvironments. Reciprocity is embedded in the compound and in extended family structures which include lineage heads who are empowered to mobilize land (communal fields) and labor to produce for a common granary against which "insurance claims" can be made.

Table 1 from Carter (1991b) shows the estimated effectiveness of these devices for both the central zone and northern Sahelian zone of Burkina Faso. The first row of Table 1 shows the risk which would result in the (counterfactual) case in the which a production-consumption unit pursued a monocrop strategy. In the Sahelian north, monocropping millet would imply a 26% disaster probability. For the central zone, monocropping sorghum yields a disaster probability of 19%. Subsequent rows of the table show the piece-wise contribution of various risk management devices. As can be seen, full conditional self-insurance reduces risk substantially in both the northern and sahelian environments. The addition of a stylized exogenously enforced reciprocity scheme, such as that provided by compound sharing (see the notes to Table 1 notes for details), nearly eliminates disaster risk in the central zone. In the Sahelian zone, exogenously enforced reciprocity drops the disaster probability from 23%.

### 1.3 *Credit.*

The traditional large compound filled or obviated the need for intermediation of risk and demographic or life-cycle needs. The other two purposes to which credit is put are short-term loans for working capital and long-term loans for entrepreneurial investments. In traditional agriculture in the Sahel, however, credit was unimportant for the purposes of capital investment, because there were no technologies available that could make use of capital to intensify production and make it more productive (Lowe 1986; Matlon 1987; Platteau 1988). The chief uses of credit in the countryside,

therefore, would have been to intermediate private risk coping efforts. But, as was seen above, much risk-coping was undertaken communally, and the use of credit for this purpose must be understood as an unusual last resort, rather than common practice.

Informal credit markets have taken the form of land-pledging (in which the creditor has full use rights of the borrower's collateral--land--for the duration of the loan), informal lending, and *tontines*: small, reciprocal lending groups. None of these credit market substitutes, however, are perfect or even very attractive means of financial intermediation. *Tontines* are not spot markets for capital; they are small-scale, lumbering, long-term savings plans. Informal loans carry a very high rate of interest, in part because of the problems surrounding contract enforcement alluded to above. Collateral in land-pledging arrangements was generally an amount of land for which one year's harvest would equal the loan amount. With an effective annual interest rate of 100%, the land pledged on such loans is often never redeemed, and the difference between land pledging and land sales is slight (Coqu ery-Vidrovitch 1985).

#### 1.4 Land

Land in the Sahel has customarily been considered to be communally owned. This means that all members of the local community have rights of access to land for production, and that some village authority (a chief, a land czar, a council of elders) has ultimate (though loose) control over how and by whom the land is used. Land has never been an open access resource, even in those areas where land is abundant, for the rights to use the land come encumbered with many responsibilities (Barrows and Roth 1989). Among these are included proper stewardship of the land and participation in the social sharing networks described above. Beyond these provisos, however, rights to land have always been specific to compounds and even defined individually within the compound. Hence, for example, a particular person might have both *usus* and *fructus* rights to a particular plot of land that are always secure for that individual, almost always lendable, and sometimes heritable or pledgeable. Confusion about land rights in the Sahel can sometimes be created by statements that seem to imply some sort of

giant collective in land rights. In fact, the "ownership" of the community is not an ownership in the full Western sense, and may imply no more than that outsiders must appeal to a council of leaders before using the land for any purpose. Those who are members of the community often have secure, permanent, individual rights in land (Lowe 1986; Platteau 1988; Golan 1990).

These rights to land are vouchsafed to every individual in the community, and, at the leave of the local land authorities, also to newcomers wishing to establish themselves. Most land acquisition has customarily been through inheritance (Matlon 1993). Local land authorities have settled both disputes and newcomers by giving or lending out available tracts of land. Given the historical abundance of land, this policy has served the perceived right to land quite well. Although the universal right to land is perceived as a natural right, it depends for its enforcement on an open land frontier. When land is no longer available, it is not at all clear that local authorities have the duty or the power to seize some land from those who are using it so that they can give it to others who need it. Indeed, some contrary evidence exists.<sup>4</sup> It would seem, therefore, that the right to land is more a statement of environmental fact rather than an expression of the community to make any sacrifices necessary to see that the right is effective for everyone.

### 1.5 *Wealth and the Wealth Distribution.*

Because of the open land frontier and the lack of a strong ruling authority, there were few economic or political obstacles to sub-groups of a compound fracturing off to set up a new compound.<sup>5</sup> In such an event, the leader of the splinter group would become the new compound

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<sup>4</sup>When I was in Sébédougou, Burkina Faso, I was told by the Council of Elders that land was in short supply in the village, and that therefore no newcomers would be allowed to settle there.

<sup>5</sup>As in the ante-bellum American South, an open land frontier helps to place a floor on real wages to free dependents. In both the American South and in the Sahel, complex sets of social and institutional structures existed—including slavery—to keep this floor as low as possible. The difference between the two is that the American South had a well-developed infrastructure and central political authority to track down and punish slaves who would try to take advantage of the abundance of land by running away. The Sahel's more poorly developed infrastructure placed limits on the likely punishment for runaway slaves, so that there was more of an incentive for slaveowners to prevent the slaves from fleeing by offering them attractive working and living conditions. It is perhaps no

head, with all the rights and responsibilities accruing to his position. The new compound would be a dependant of the old compound, but the tribute (if any) to be exacted from this arrangement would have a more ceremonial than material value. These low barriers to exit would imply that to maintain a large compound, its head would have to provide sufficient incentives for each potential faction to stay in. The open land frontier would also imply that each compound could have as much land as necessary to produce up to the levels of neighboring compounds, but would have little incentive to accumulate more land than what could be farmed by its members. The distribution of access to economic resources in the Sahel, therefore, has traditionally been very equal.

Where many writers—and especially anthropologists (Baudoin, Coquéry-Vidrovitch)—have located the reason for the relative equality of resource access in the Sahel in cultural norms and the need for survival as a group, a more institutionalist analysis shows that in fact African equality is really a result of the inability—because of the abundance of land—of any economic group to exclude others from its use<sup>6</sup>.

Notwithstanding the relative egalitarianism in people's access to land, there were important differences in status, as well as a notion of wealth attached to these differences. This wealth included livestock and stored grain, but focussed most importantly on control over other people, and, in particular, over their labor power. A rich man had many wives, and a rich compound head had a large compound.

The reason for this identification of wealth with control over people was not so much social as environmental. Because there was little besides food and other immediate necessities that could have been produced in the Sahelian environment, and because trade with the outside world was largely

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coincidence that slavery and serfdom were first abandoned in those areas like Western Europe and her tropical colonies, where land was scarce, then in the U.S., whose land frontier closed a generation after the Civil War, then in Eastern Europe and Russia, and mostly recently in the customarily ruled, land-abundant areas of the Sahel and Maghreb. (Slavery was finally officially abolished in 1984 in Mauritania.)

<sup>6</sup>To be sure, large inequalities exist across age groups and, especially, between men and women. Significant though these inequalities are, they do not approach in magnitude the differences across households in land endowments of, say, Latin American agriculture.

lacking, the prospects for consuming much more than subsistence were nil (Baudoin 1975; Platteau 1988). Rather than maximizing consumption subject to a labor constraint, therefore, people maximized leisure and social prestige subject to a subsistence constraint. Understanding the preeminence of prestige over consumption elucidates Baudoin's otherwise strange comment: "...we must remember the dual objective that is implied, in the economic domain, by their internal logic. Their concern is effectively summed up by two propositions: to prevent shortfall and to prevent surplus." P. Metais, introducing Raynaud's 1973 study of economic inequality in Niger writes, "The whole of the village has a tendency to live above its means...Everyone is perhaps motivated ...by the desire, the need, to worthily acquit his customary obligations, to assure his new position, his prestige, his modernism..."

To summarize, the basic unit of economic organization in Sahelian agriculture was the extended family compound, in which numbers of related households banded together for the purposes of production and consumption. This compound-based production system assured that everyone's consumption needs were met in times of illness and bad harvest, and that all had enough access to land to farm for subsistence. The functions of insurance, labor markets and credit were all filled by the structure of compound production, much as a medieval manor filled the economic needs of its residents. Production was mainly of a subsistence character, and the material conditions of existence were very nearly the same for all members of the community. Everyone worked the land together in the same way, and everyone partook nearly equally of the fruits of the land. This system was profoundly shaken by the coming of the Europeans, whose influence would lead to the break-up of the compound structure of production and consumption, and encourage a capitalist accumulation of goods and resources.

## **Section 2      Dissolution of the Agrarian Compound**

The traditional agrarian systems of the Sahel had been based on subsistence production with prestige as the coin of utility because there was little in the local economy worth consuming in large

quantities. When Europeans came into contact with Sahelian peoples, however, they introduced over time a wide variety of new and curious products to excite the interest of their subjects: Western jewelry, cloth, foods and liquor at first; and later radios, motorcycles, tin for roofing, cement, cameras and perfume. Europeans also improved means of transport and communication, so that such goods became commonly known and readily available throughout the Sahel. Old uses for surplus production included some such products, although at considerably greater cost, but centered around large village feasts: weddings, funerals, and so on.

The effect of the arrival of the more varied Western goods was to sharpen the incentives for consumption—and hence production and accumulation—and to weaken both the relative attraction of leisure and the relative force of social approbation or opprobrium as motivating or constraining factors on individual behavior<sup>7</sup>.

The effect of the availability of these Western products therefore goes far beyond a mere change in consumption patterns, and implies a shift in the relative incentives that condition economic, and therefore also social, action. This development is profound, because it makes the capitalist accumulation of material things attractive to individuals, both by making consumption more attractive, and by decreasing the relative significance of any social strictures against individual opulence. Grégoire and Raynaud (1980) see in the introduction of new products into Africa the installation of a new economic order:

Trade is...an ancient activity in Hausa culture. The novel element, which appeared at the beginning of the century, was the introduction and subsequent generalization of the use of modern money. Not that the Hausa had been unaware of money: cowry shells, Maria-Theresa dollars, as well as other forms of money of European or North African origin had functioned for centuries as media of exchange and stores of value. The radical novelty resided in the fact that the money introduced by the colonial power was the key element in a broader strategy aiming at the establishment of a new economic order. The two main planks of this new order were the imposition of a head tax payable in specie, and the development of trade (exchange, intermediated by the colonial money, of imported manufactures for local agricultural products). In sum, one can say that the essential consequence of this evolution

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<sup>7</sup>In formal terms, the argument is that the new goods did not just allow for an increase in consumption leading to an increase in utility, but actually either decreased the satiation parameter of utility (i.e.,  $\sigma$  in the expression  $u(c)=A c^{(1-\sigma)}$ ) or increased overall utility ( $A$  in that expression). For a given level of consumption, both utility and marginal utility would increase.

was to open up the peasant economy to a market that functioned according to rules and imperatives that were fundamentally capitalist, and hence largely foreign to customary objectives.

Before capitalist accumulation can be possible, however, the factors of production--land and labor--must be freed from social constraints so that they can enter the marketplace.

### 2.1 *The Commoditization of Labor.*

If the Europeans brought with them new products that tended to divorce prestige from direct control over people, they also imposed taxes that had the effect of making direct control over people less attractive. Households fractured, becoming considerably smaller, for many reasons, but chief among them was the head tax that was paid by the compound head on all the adult members of his compound (Raynaut 1973; van der Klei 1978). If this tax was not enough to torpedo the unity of large compounds, the job would be accomplished by the contentious allocation of resources to a much larger and more varied array of consumption choices. Many of these new goods are expensive and indivisible: cement houses, bicycles, motorcycles, radios, rifles, education. Each post-harvest season entailed a delicate negotiation over who in the compound would get what. In the lopsided decision-making process of the customary household, dissatisfaction would surely breed discontent, and it is not hard to see how new goods would engender new jealousies, which in turn would cause the compound to splinter into smaller compound each with more homogenous views on how to make spending decisions. As a result, compounds emerged which englobe only one or two households, and average compound size decreased markedly.

This process of compound fracturing tends to engender a labor market, as people seek external ways of equalizing rates of application of labor to land--ways which had once been internal to the compound. As Raynaut (1973) writes:

When the Chief of Garin Gizo gives independence to his children, divvies up among them the land belonging to the extended family, frees them from the constraints of collective work, and then hires them as farm laborers on the plots he kept for himself, his behavior illustrates a fundamental process: the emergence of new production relations which--substituting themselves for those old modes which had been the norm

of the family community, made as they were of solidarity and mutual obligation--create a dissociation between work effort and the appropriation of its fruits.

There is now increasing evidence that labor in the Sahel is becoming a saleable commodity, and that there is a class of agricultural laborers, most of whom are land-poor, and some of whom are landless altogether (Bassett 1988; Raynaut 1976,1980; Golan 1990). Some of these laborers work for local villagers with larger than average plots or special labor needs. But others work for wealthy--and often absent--landowners who live and work in the cities (Saul 1988; Collier 1983; Mathieu 1990).

## 2.2 *Threats to Customary Forms of Risk-Coping.*

Before a subset of the compound community can be released from its membership, however, it must first be released from the pressures that sustained its adherence there in the first place. The large size of the extended family compound enabled it to maintain an important risk-coping function. Traditional risk-sharing mechanisms in the Sahel depend on a balance between covariance (which demands that participants be scattered in different agro-climatic zones) and moral hazard (which demands that they have some affective ties to one another) (Platteau 1990). The large compound achieved this balance by scattering a large number of close family members over a modest area. With the advent of improved infrastructure and off-farm employment opportunities, some households--mainly the wealthiest ones--became better able to insure themselves by allowing members to migrate to regions or forms of employment which would not be dogged by a risk highly covariate to that of the home region.

But if the opportunity of wage labor on the part of some plays a role in weakening customary risk-coping arrangements, as these arrangements weaken, others are forced onto the wage labor market whether willing or not. A fracturing household does not just decrease the risk pool for those who want to split off; it does so equally for those who would rather the risk pool remained large. In particular if some agents become wealthy enough, or have enough exterior opportunities, they may elect for quite rational reasons to withdraw from customary social sharing networks. But those left behind may not have enough variation in their production outcomes to sustain an effective risk pool,

and may have to either find other forms of risk-coping or put up with higher risk. The point is that new opportunities render risk-sharing a precarious institution. One pillar of the large compound—that of the risk-sharing pool—had effectively been kicked out from under it by the opportunities presented by migration and wage labor.

### **Section 3      Differential Risk-Coping and the Emergence of a Land Market**

There is mounting evidence that agricultural land is no longer in plentiful supply in the Sahel. Although population densities are not high by international standards, land pressure in many areas is quite severe given the carrying capacity of the land (Lowe 1986; Platteau 1988). Land has a positive shadow price, and, in places, a fairly high one. New technological developments drive up the shadow price of land, as do new opportunities for cash crops such as cotton, citrus and vegetables. With this unrelenting increase in the shadow price of land, it would seem to be only a matter of time before the shadow value of land exceeds both a utility premium to letting it out for free, and the legal obstacles to letting it or selling it for money.<sup>8</sup> The time would appear to be ripe for the induced innovation of completely privatized land rights and a land market, as Feeney (1985) and others have suggested.

This section examines this induced land market hypothesis by analyzing the increase in the shadow price of land against the backdrop of the dissolution of the compound. As described in the preceding section, where once large compounds assured a fairly low level of consumption to large numbers of households, those compounds have now become fractured and individualistic. Risk coping has become individualized and potentially differentiated across agents based on their privately held endowments and exchange possibilities. This section argues that the conventional induced land

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<sup>8</sup> Indeed, despite the still common perception that land is inalienable and non-economic, land is transacted, and it is clearly (and increasingly individually) owned—even in the Western sense (Raynaut 1976; Lowe 1986; Platteau 1988; Mathieu 1990; Golan 1990). Even the right of future generations to inherit land—which would seem to rule out any land sales—is already in some places severely compromised by the practice of land pledging, in which the land is never redeemed by repayment of the loan (Raynaut 1976; Coquery-Vidrovitch 1985).

market hypothesis is incomplete in the sense that it is the interplay between scarcity value and individualized risk coping which creates the material basis for inducing a land market.

In their analysis of agrarian structural change, Braverman and Stiglitz (1989) provide some provocative hints about the interaction between risk and scarcity value. In their model, better endowed agents have an incentive to buy out smaller agents, but they conclude their analysis by asking why any smaller agents would ever want to sell off. The same question could be asked of the induced institutional innovation perspective. A high shadow price of land may induce people to adopt private ownership of land to protect their investment in it, but what would form the basis of exchange in a land market? Only greatly differentiated shadow prices of land would induce land sales, especially when transactions costs and tenure insecurity deaden the desire for land transactions.

Where land has a high shadow price, there is a potentially positive land price, but a land market will arise only where there are willing buyers and sellers, which is to say, where there are people across whom the shadow price of land differs. Buyers might include those at an accumulating stage in the life-cycle, or those with especially buoyant access to capital. Sellers could include those on the decumulating side of the life-cycle curve or those with especially pressing consumption requirements. In an environment where agriculture is still very low-input, differences in the shadow price of land due to variation in the application rates of human or physical capital are unlikely to arise. Because of the close ties among members of an extended families, and especially because of the continuing possibility of land borrowing, life-cycle effects are also unlikely to generate the high differentials in land shadow prices necessary for a land market.

Arguably, the largest disparities of land shadow prices are likeliest to arise because of short-term consumption requirements. With the slow disappearance of customary, compound-based risk-coping arrangements, the likelihood of a household finding itself with insufficient resources to meet subsistence requirements increases, and along with it, the likelihood that they would have to resort to liquidating cadastral assets to meet consumption requirements. Although alienating a productive asset in this fashion is clearly sub-optimal within the context of economists' standard, intertemporal

rationality, the existence of desperation sales suggests that if a transitory shock can push consumption low enough to threaten the agent's continued survival, selling off land may in fact be an optimal response. Indeed, the standard result that agents should push current-period consumption a little lower is due in no small measure to an overly credulous assumption of an infinite-horizon maximization horizon. Endogenizing death would go a long way toward explaining the dynamic behavior of subsistence-level households. The next section presents a model to explore these issues.

### **3.1 Compound Dissolution, Individualized Risk Exposure and the Appearance of an Active Land Market**

Carter and Zimmerman (1993) formulate a dynamic stochastic programming model to explore the need for and operation of a land market in a stochastic world with technical and environmental parameters calibrated to the reality of contemporary West Africa. This section examines the operation of that model under two institutional scenarios. In the first, the customary compound structure is assumed to exist and pool risk among its members. In the second, the compound is dissolved and individuals rely completely on their private resources to realize production and consumption. Under the first scenario, no land market transactions take place. Under the second, agents actively use the land market and the structure of agriculture evolves over time.

The Appendix presents a summary of the dynamic simulation model. For the analysis here, the model was set up to study an isolated village economy composed of 96 agents (or conjugal units). Each agent within the model has an infinite-horizon utility maximand, but is subject to the constraint that he or she consume at least a certain minimum subsistence level in every period. Agents hold land and stored grain according to an initial distribution of endowments. Their output is a function of their land holding and of a covariate village and individual specific stochastic shock. Following the realization of the shocks, and of their corresponding production level, agents consume, buy or sell land, and accumulate grain to maximize the present value of their infinite-horizon stream of consumption. Accumulated grain is saved in the form of livestock and thus generates a modest positive rate of return. The land price evolves endogenously in the model (to clear the land market

every period), and agents have rational expectations over the price distribution and its covariance with village shocks. The entire model is parameterized to data collected by ICRISAT in Burkina Faso. In conformity with that data, it is assumed that all households require 800 kilograms of grain per-year to assure the subsistence of its members. Initial land and grain stocks are similarly calibrated on the observed asset distributions. The model abstracts from life-cycle effects and from exogenous differences in land productivity.

Using the empirically observed distribution of land among households, a stylized customary compound structure was generated by grouping together into a single production/consumption unit four households representing four different size strata. This aggregation scheme was used to represent the uneven distribution of land access within a compound before the fracturing process began. The compound head would have had access to large amounts of land, while subservient younger, unmarried men and women would have had access to small amounts of land. As the compounds fractured, this unevenness in land access persisted, since departing members had no claim to a portion of the land controlled by the compound head. Aggregating households randomly into compounds would erroneously ascribe very small amounts of land to some compounds and very large amounts to other ones.

Using the simulation model described briefly above, the endogenous demand functions for land for every simulation compound were generated. Because risk was spread out within the compounds, there was no agent for whom consumption fell below subsistence. This effective intermediation of risk (together with the assumption that land displays constant returns to scale), all compounds' demand curves were found to be exactly identical, leaving no basis for exchange of land between compounds. At high land prices, net demand for land was zero, and at low land prices, it was equal to the entire market.

This situation of a legally permissible but dormant land market can be contrasted with one of private land rights, individualized production and consumption, and (differentiated) self-insurance against risk, mainly through accumulation of grain stocks. The dynamic stochastic programming

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**Table 2: Results of a households' accumulation decisions.**

	Buyers	Sellers
Number	35	61
Mean Land Demand (ha.'s)	0.26	-0.16
Mean Land Stock (ha.'s)	6.54	1.43
Mean Grain Stock (kg.'s)	654	652
Mean Income (kg.'s)	4631	1526
% Bad Shock	6	16
% Below Subsistence	0	39

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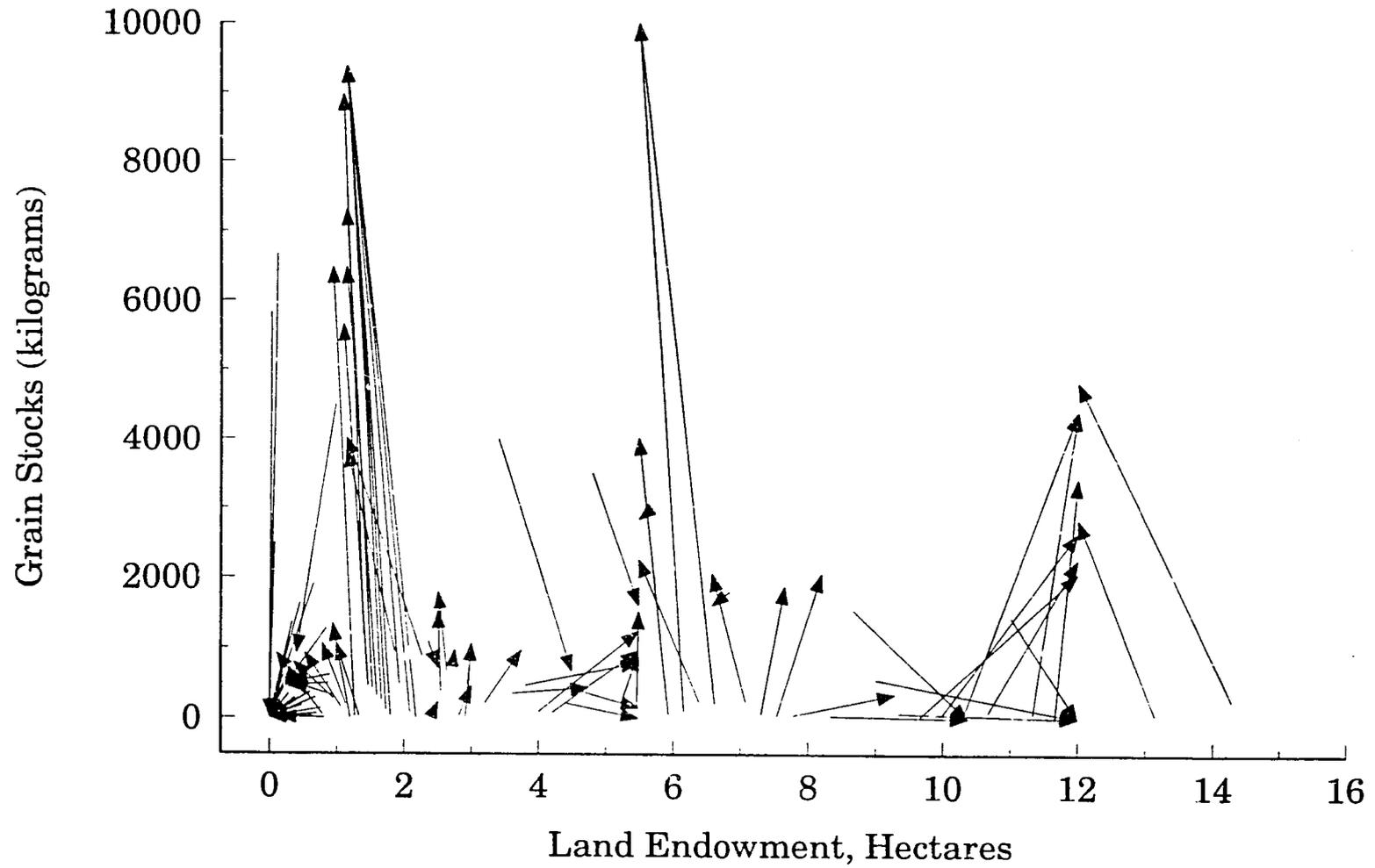
model was accordingly simulated again, using the same parameterization, but without the compound structure. Under this scenario, agents made frequent recourse to the land market, and the direction of their transactions actually shifted the distribution of land.

Table 2 and Figure 2 present summary results of the dynamic simulation under individualization. As can be seen from the summary statistics in Table 2, agents who sell off land have a higher incidence of adverse shocks, and also include the totality of agents for whom disposable income falls below subsistence. Significantly, agents who sell land also have smaller land stocks to begin with. Figure 2 draws out more clearly the structural consequences of the land market transactions. Each point in the diagram portrays the initial endowment position of one of the 96 village households. The vector indicates the unit's trajectory over the simulation period. As can be seen, the household units with the least amount of land tend to shed their land over time. Those with larger initial endowments tend to modestly accumulate land. While the model is too simplified to be taken as a prediction of the pace and direction of structural evolution<sup>9</sup>, the contrast with the

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<sup>9</sup> In particular, households have other activities in their portfolios. Interestingly, however, Reardan and Matlon (1991) find that wealthier households are also those with largest number of income earning activities.

Figure 2: Asset Trajectories and the Land Market  
under Individualized Risk Exposure



compound simulation highlights the importance of both risk and scarcity value in bringing forth a land market. The next section more carefully considers the material interest of different agents in the emergence of a land market.

### 3.2 Decomposing the Demand for a Land Market: The Uneven Economics of Induced Institutional Change

The analysis in the preceding section showed that the individualization of risk exposure sufficed to bring forth a land market in an environment of land scarcity. It also showed that the land market seemed to work in a systematic, as opposed to a stochastic way. Agents with more modest initial endowments tended to sell land. Those with stronger endowment positions purchased land. Greater insight into the economics of induced institutional change can be had by identifying the distinct "class" interests in a land market when risk has been individualized.

Figure 3 begins that class analysis by partitioning the land-grain endowment space into food security regions based on single period probabilities of production and asset shortfalls. The southeastwardly most space, labelled "Subsistence Crisis", is one in which any agents whose endowments place them in that space face a positive probability that they will have a subsistence shortfall even if they consume all stored grain and sell off all their land. Those within the "Land at Risk" region face a probability of land sales in order to avert a subsistence crisis. Agents in the "Certain Grain Threat" ("Possible Grain Threat") space are certain (may) have to draw down their grain stocks, depending on the stochastic realization. Not surprisingly, the actual sellers in the individualized dynamic simulation reported above were occupants of the regions characterized by higher degrees of risk exposure.

While useful as a reflection of what happened in the dynamic simulation, Figure 3 only takes us part way toward understanding the economic value of a land market and the individual interests which might institutionally induce it. Figure 4 presents a contour mapping of the "compensating variation" which would have to be paid to agents located in different regions of the endowment space if they were denied access to the land market. The compensating variation is the kilograms of grain

Figure 3: Food Security Regions

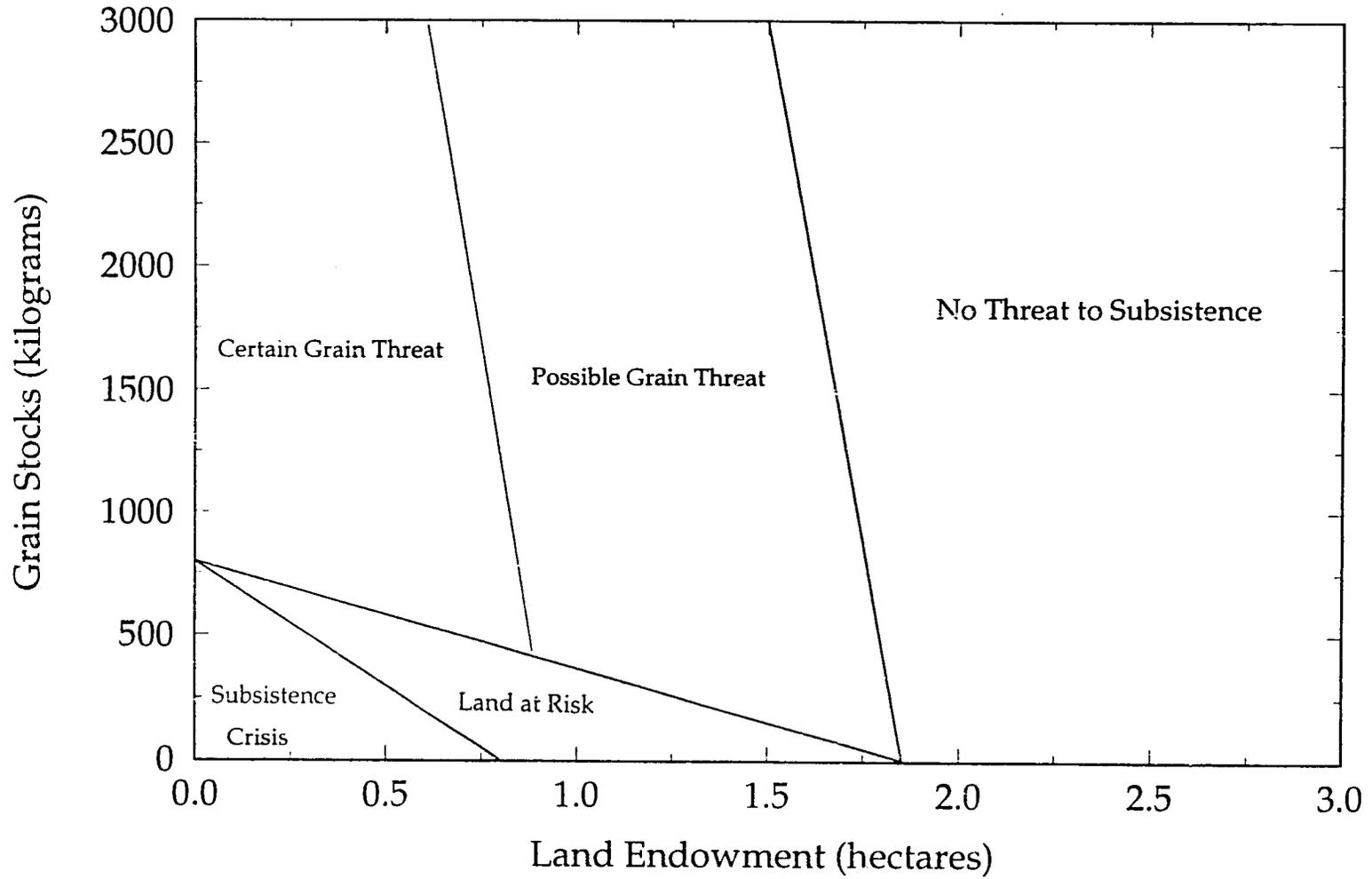
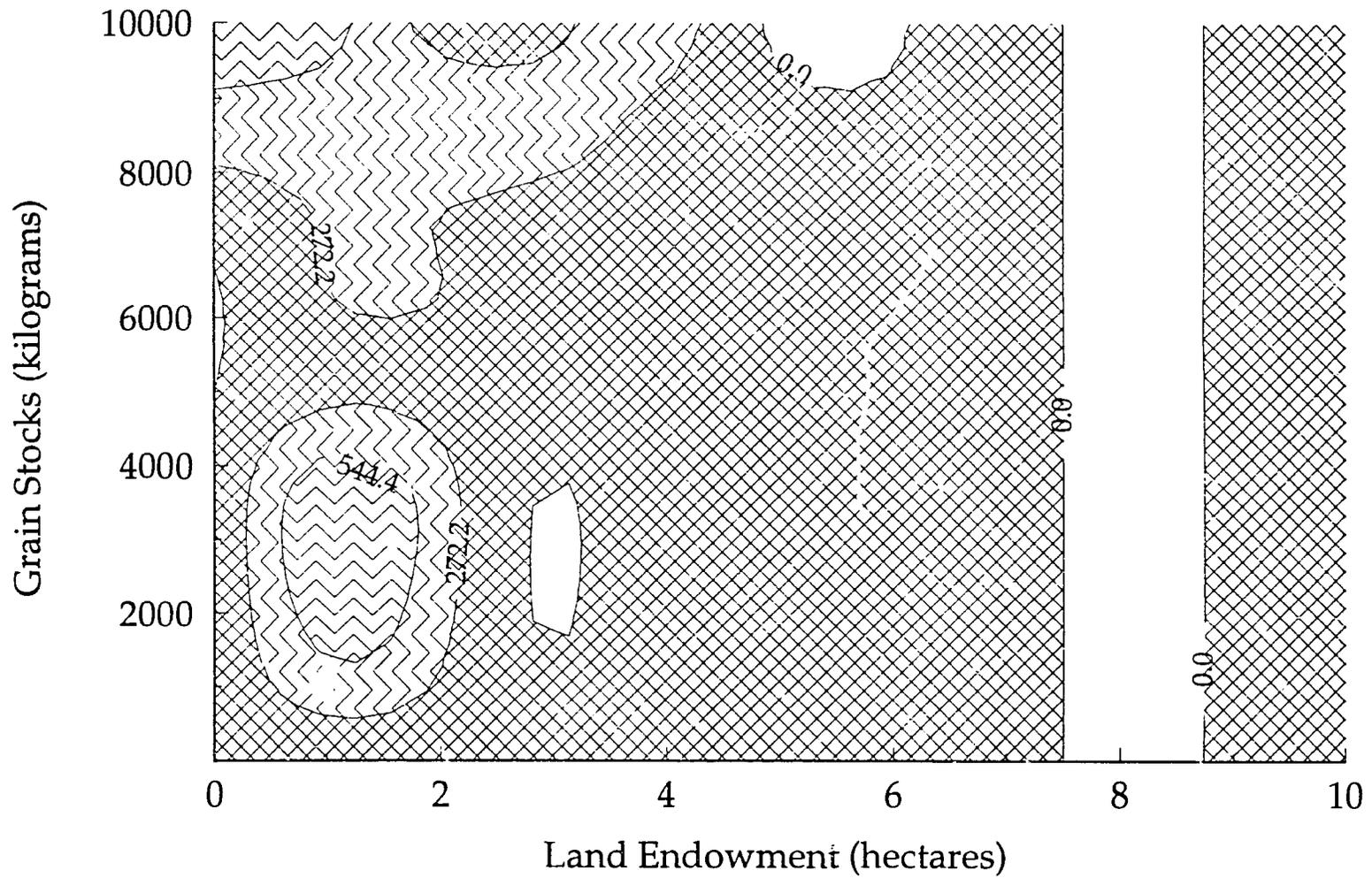


Figure 4: Compensating Variation Measures of  
of the Economic Value of A Land Market



which would have to be given to each household every year to leave them no worse off (in terms of their expected stream of utility) than they were when they had recourse to the land market. Higher compensating variation values indicate that the land market is more valuable to an agent—i.e., more grain would have to be given in order to compensate him or her for loss of access to a land market.

In the context of the current model, a land market offers two potential advantages. First, it allows individuals to cash in some portion of their assets in order to smooth consumption and meet subsistence needs. Second, it allows individuals to adjust their wealth portfolios, either shifting wealth out of land and into safer grain stocks, or out of grain and into potentially more remunerative land stocks.

As can be seen in Figure 4, agents located in what Figure 3 portrays as the two riskiest regions of the endowment space have assigned only a modest value (approximately 100 kilograms of grain per year) to opportunity to access the land market. As the simulation showed, agents in these regions in fact intensively participate in the market, selling off most of their land. These sales smooth consumption for while, but ultimately only postpone rather than alter, the long term fate of these individuals. The value of the land market is in the end relatively limited for these individuals.

The compensating variation rises sharply as grain stocks increase enough to move the agent out of the two highest risk classes. Compensating variation rises to over 500 kilograms for individuals with endowments in the neighborhood of 1 hectare and 3000 kilograms of stored grain. As Figure 2 showed, individuals in this area were still net sellers of land, but they seem to follow a portfolio rebalancing trajectory which has them shift land to grain wealth in an effort to escape the "at risk" classes. As grain stocks rise towards 5000 kilograms, compensating variation drops off sharply again. Individuals with grain stores in this level appear to be in balance, with desire neither to shift to safer (more grain-intensive portfolios), nor to entrepreneurially risk the shift to increased land holdings in pursuit of higher returns.

In contrast to this semi-autarchic class, compensating variation again rises very sharply for individuals with even higher grain holdings. While no such individuals were included in the

simulation, it would be expected that such individuals would appear on the demand side of the land market given their ample supply of grain which underwrites their self-insurance.

Finally, the eastwardly portion of the endowment space occupied by individuals who face no immediate threat to either their subsistence or their asset stocks attach a modest compensating variation value to the land market. It is individuals in this region who in fact primarily comprise the demand side of the land market in the dynamic simulation. Their interest in the land market should depend on the relative incentives to shift their portfolios between grain (livestock) and land. Unlike individuals in the extreme northwest of the endowment space, these agents experience slightly diminished returns to land. How attractive the land market is to them depends critically on the land price. The particular price trajectory used to generate Figure 4 saw an increasing in land price over time. A lower land price expectation would increase the value of the land market for this class of better endowed agents. Conversely, a lower land price trajectory would reduce the compensating variation for the "at risk," land selling classes.

These results strongly suggest a more nuanced understanding of the development of demands for a land market, and of institutional change more generally. In particular, there seem to be two parallel developments that are necessary—though perhaps not sufficient—to generate pressure for private, transactable rights in land. First, new economic opportunities sharpen the incentives for both consumption and differentiation, thereby putting pressure on the integrity of traditional compounds and on customary risk-sharing arrangements. As production and consumption become through this process to be increasingly individualized, the operation of adverse shocks forces the poorest households into a position of depending on whatever assets they have to meet consumption requirements. At the same time, increasing land pressure, together with the break-up of compounds, makes land an attractive productive asset to accumulate. The juncture of pressing consumption needs of unlucky peasants who have some land, and the newly honed avarice of wealthier peasants means that a potential basis for exchange has been generated.

### 3.3 Emergence of a Land Market and Structural Evolution in Contemporary West Africa

There are a number of examples already of agricultural land changing hands for money. In Burkina Faso, M. Saul (1988) records sales of peri-urban land for gardening, as does J.Y. Marchal (quoted in Ancy 1975). In Houndé, in Burkina Faso, a village chief was deposed and punished for having exacted an illicit fee of 20,000 francs CFA (\$75) from each migrant household requesting land in the village. Raynaut (1976) describes a healthy land market around Marači, Niger, and Golan (1990) in a study of a Senegalese village found that 62-87% of compounds felt that the compound head had the right to alienate land, and in fact 5-6% of land had been acquired by sale or trade.

Perhaps the most salient example of the development of pervasive land transactions, however, is Michael Watts' 1984 study of Northern Nigeria. Watts analyses the effect of the British colonial poll tax on indigenous risk-coping strategies. He describes a progressive fracturing of family compounds, a concomitant erosion of risk-coping ability, and, finally, the progressive development of land sales as a means of meeting consumption needs after adverse production shocks. Not only are poorer households at greater risk of meeting consumption by alienating a productive asset, but the covariance of village-level shocks implies that poor households are often in a situation of selling off land when its price is lowest. Watts' study raises some highly provocative questions for economists: Why aren't households able to save grain in good years to relieve the pressure on land in years of an adverse shock? Would the same patterns be observed if a colonial power were not extracting significant resources from agriculture through annual head taxes? Carter and Zimmerman (1993) analyze these issues from the perspective of a rational choice, dynamic programming model that allows agents to intermediate risk through an incentive-compatible risk-sharing scheme. Their results suggest that Watts' principle insights about the danger of structural concentration in West Africa hold even in a market economy without net resource extraction, but that policy interventions can blunt both the pacing and the long-term effects of such a process.

#### Section 4 Conclusion

At first glance, land markets appear as but one component of the shift from economic relations embedded in customary compound structures to the intermediation of markets. However, the analysis here suggests that the emergence of the land market (understood as an induced institutional innovation) is inextricably bound up not just with the dissolution of the compound, but also with the emergence of individualized and differentiated risk-coping capacity. That is the demand for a land market emanates as much from the intrinsic deficiencies of financial markets in low income, rainfed environments as from the disappearance of the compound *per se*. The analysis here has shown that the need for the poor to use the land market to smooth consumption occasions a demand for a land market among better endowed agents who can then use the market to increase their wealth.

This perspective on the interacting yet distinct interests which may endogenously induce a land market is highly suggestive of the way a land market may work under these circumstances. Simulation analyses carried out in this paper and in Carter and Zimmerman (1993) bear out this suggestion as a relatively egalitarian initial endowment distribution tends to pull apart over time as agents optimize and interact through the land market. Ultimately, the policy implications of this perspective is not that land markets are in some sense "bad" (for their existence improves the intertemporal welfare of the poor), but that priority must be given to finding incentive compatible substitutes for the risk management functions of the traditional compound lest the agrarian economy set off on a trajectory of dubious social desirability.

## Appendix

As described in the text, agents in the village economy model maximize expected, infinite-horizon utility:

$$\underset{\{c_s, T_s, M_s\}}{\text{Max}} E_0 \left\{ U \sum_{t=1}^{\infty} \delta^t u(c_t) \right\} \quad (1)$$

$$\begin{aligned} c_s &= \{c_s, c_{s+1}, c_{s+2}, \dots\} \\ T_s &= \{T_s, T_{s+1}, T_{s+2}, \dots\} \\ M_s &= \{M_s, M_{s+1}, M_{s+2}, \dots\} \end{aligned}$$

$$\text{s.t. } c_t \leq F(T_t, \Theta_{it}, \Theta_{vt}) + \mu M_t - P_{Tt}(T_{t+1} - T_t) + (M_{t+1} - M_t) \quad (2)$$

$$F = \Theta_{it} \Theta_{vt} D (T_t)^\sigma \quad (3)$$

$$c_t \geq \min\{R_0, F(T_t, \Theta_{it}, \Theta_{vt}) + P_{Tt} T_t + M_t\} \quad (4)$$

given  $T_0, M_0, \Theta_{i0}, \Theta_{v0}$

where:

$\Theta_{it}$	idiosyncratic shock to individual $i$ in period $t$ .	$\Theta_{vt}$	a village-level shock in period $t$
$D$	land productivity parameter	$T_{it}$	is $i$ 's land stock in period $t$
$F_{it}$	$i$ 's production in period $t$		
$\beta$	labor productivity parameter		
$\sigma$	output elasticity parameter	$\mu$	average growth of livestock divided by avg. fraction of livestock in non-productive asset
$M_{it}$	stored grain and livestock		
$P_{Tt}$	land price in period $t$		

Maximizing this infinite-horizon problem involves calculation of a true value function within the context of a dynamic programming model. Carter and Zimmerman (1993) detail the precise method of calculating the true value function and also discuss in detail the treatment of price expectations.

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