Property Rights and the Political Organization of Agriculture[*]

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Abstract

We propose a general equilibrium model where the economic organization of agriculture and the political equilibrium determining property rights security are jointly determined. The rational anticipation that tenants may try to become squatters or reform beneficiaries can lead to suppressed tenancy, lost output, and the deferral but not the resolution of latent political conflicts. Yet under some circumstances this anticipation can instead spur side-bargains and land sales market activity that lead to relatively efficient land transfers. We test some implications of the theory using a five-decade panel dataset that traces changes in the extent of tenancy and tenancy reform across fifteen Indian states.

Keywords: Agrarian Organization, Tenancy, Political Economy, Squatters, Agrarian Reform.

JEL Classification: Q15, O12, N50, D72

1 Introduction

The study of the nature and determinants of agrarian organization is one of the oldest topics in economics and the system of *metayage*, or sharecropping, was discussed by Adam Smith, J.S. Mill and Alfred Marshall. A dominant theme in this literature is that contractual arrangements and equilibrium ownership patterns should be shaped principally by the incentive problems that arise when labor effort or other relevant production actions are difficult to observe, or costly to monitor.[1] Theory tells us that a whole class of such incentive problems may be solved, or at least ameliorated, by renting or selling the agricultural firm to the agent since residual claimant status better aligns the agent's objectives with those of the production enterprise.

A successful theory of agrarian organization ought to be able to account for the large differences in patterns across countries and continents, and its evolution over time. For example, in the absence of scale economies, this theory predicts that, all else equal, total land area under tenancy should be expected to be higher in areas where land ownership is more unequally distributed, as lease markets reallocate land from households with a relative abundance of land toward those with farming skills but relatively less land. While actual comparisons of aggregate tenancy patterns across regions are complicated by agro-climate and technological considerations, we should nonetheless expect a relatively lower incidence of tenancy in regions like Asia where land inequality has historically been comparatively low (particularly after mid 20th century land reforms in China, Japan, South Korea and Taiwan). Contrariwise, we would expect a relatively high fraction of cultivated land to be under tenancy in Latin America where land inequality has been extremely high.

That this is evidently not the case can be seen in Tables 1 and 2. The first table, adapted from Hayami and Otsuka's (1993; Table 1.1) survey of agricultural contracts, indicates important differences in the use of tenancy across regions. In a sample of twelve European countries for which comparable data was available over 40 percent of cultivated land in 1970 was farmed under pure tenancy on land cultivated or by owners who also leased in land. In the United States and Canada the comparable figure was over 60 percent.[2] For a sample of ten Asian countries, approximately 16 percent of land

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[1] Cheung (1969) and Stiglitz (1974) are early examples of the modern approach. Literature surveys include Bardhan (1989), Bardhan and Udry (1999), Basu (1997) and Hayami and Otsuka (1993).

[2] These figures somewhat overestimate the actual extent of tenancy because they cannot distinguish

was under tenancy. Table 2 indicates however that prior to experiencing far-reaching redistributive land reforms, countries such as Korea, Japan and Taiwan had tenancy rates close to or above 50 percent. Latin America stands out in sharp contrast to these other regions: despite having by far the most concentrated land ownership pattern, and fewer laws to regulate tenancy contracts, less than 12 percent of cultivated land was under tenancy in 1970. For the case of India, described in Table 3 and in more empirical detail below, the share of cultivated land reported under tenancy has collapsed unevenly across states since independence.

To account for such differences across regions, and for such dramatic changes over time, existing theories would have to assume fundamental differences in information and market structures have removed the advantages of tenancy in certain cases but not others or that agro-climate or technological considerations dictate for instance that crops in Latin America are subject to greater scale economies.[3] But this too seems to fall short of a complete explanation for several reasons. First, the fraction of cultivable land under crops subject to technological economies of scale does not seem large enough to explain the magnitude of the observed differences, except for certain countries and regions (Sokoloff and Engerman, 2000). Comparisons of agrarian organization on a crop by crop basis also reveal a relative paucity of tenancy arrangements in many parts of Latin America compared to others. Finally, the highest extent of tenancy is found in North America where heavy mechanization might be expected to have made economies of scale important.

In this paper we explore a political economy theory of agrarian organization which presents a complementary approach to explaining these facts. The modern literature has stressed the economic environment as the key determinant of agrarian structure. In doing so, however, it has almost always assumed that property rights to land are secure. Yet, property rights over land have been contested and redefined in almost all agrarian societies, and agrarian reform has been one of the burning political issues of the past century (Binswanger et. al, 1995). Although agrarian reforms have at times taken place in revolutionary and military occupation contexts, for example in South Korea, Taiwan,

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between owned and leased land operated by owner-cum-tenants. Figures from the 1997 US Agricultural Census help clarify this distinction however, by indicating that in the USA approximately 53 percent of land operated by owner-cum-tenants was leased land. This leads to an estimate that approximately 49% of harvested cropland in the United States was cultivated under leased land. Assuming the same ratio held for the data of Table 1, then approximately 40 percent of cultivated land in North America was under tenancy in 1970.

[3]Theories that appeal to credit market imperfections (e.g. Eswaran and Kotwal, 1986, Banerjee and Newman, 1993, Legros and Newman, 1996) and limited liability, or to the uneven distribution of non-traded skills may also account for why fixed rent tenancy may not be more prevalent amongst the poor.

Mexico, China, or Cuba, an equally large number of reforms have been implemented or attempted in the context, or anticipation of, normal electoral competition. In Latin America important attempts at land reforms followed democratization in Bolivia, Chile, Colombia, Costa Rica, Guatemala, Dominican Republic, and Venezuela (Lapp, 2004), but reforms have also been implemented by military regimes in Peru and El Salvador in an attempt to build popular support. Political reforms extending voting rights to tenants and small farmers also led to far-reaching changes in tenancy regulation and land taxation in a large number of West European countries (Swinnen, 2000). In South Asia similar political pressures arose following democratization, particularly in India (Besley and Burgess, 2000).

Property rights are the endogenous outcome of collective political choices and a striking difference between regions of the world is the extent to which property rights have been perceived to be stable and secure in the rural sector. These facts suggest that agrarian structure could itself be affected, not just by the micro- and agro-economic environment, but also by the way in which property rights are determined and sustained. We propose a model in which the economic organization of agriculture and the political equilibrium determining the distribution of property rights might be jointly determined. To fix ideas we examine reforms which are 'to the tiller' where farmers acquire *de facto* property rights over land they already occupy as tenants or squatters. Reforms may be either simple tenancy reforms, as frequently used in India or Europe, or land reforms where ownership title is transferred to tenants or squatters who occupy the land. In such circumstances, landlords who lease land to tenants increase the feasible scope of property rights reform and this tends to increase its extent through the political system when tenants achieve sufficient political power. In anticipation of this, however, and despite possible economic benefits of tenancy, each landlord acting individually may choose to defensively limit the extent of tenancy in order to limit the possible consequence of future property challenges to their property.[4]

It has long been recognized in the literature that the anticipation of exogenous tenancy reforms may naturally limit the extent of tenancy (Palacios, 1979, de Janvry, 1981, Zamosc, 1986, Binswanger et. al., 1995, and particularly Ray, 1998, p. 418, and Jodha, 1981). It has also been recognized by several scholars (e.g., Besley, 1995; Hoy and Jimenez, 1991; Carter and Olinto, 2003; Turnbull, 2004) that individuals with insecure property

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[4]Our work is therefore also related to de Meza and Gould (1992) who studied the related question of how the costly decision to enclose a property by one landlord influenced the relative profitability of enclosure decisions by other landlords'.

rights may make investments such as property improvements to influence how secure their property rights claims will be in the future. Our model integrates these ideas into a simple general equilibrium model where land and labor markets clear and equilibrium agrarian structures are predicted alongside with the overall level of property rights insecurity.

The analysis is built around a standard general equilibrium Specific Factors or Ricardo-Viner type trade model, with two key innovations. The first is to assume a three-factor production function in the rural sector in which one of the factors is a non-traded farming skill or ability. The second is to model how endogenously-determined property rights insecurity may drive a wedge between the shadow price of land on farms that lease-in compared to those that lease-out land.[5] The first assumption delivers a determinate pattern of efficient equilibrium farm production organization under the assumption of secure property rights that the second assumption may then distort. We show that property rights insecurity provides an alternate explanation for an endogenous stratification of households into economic classes or cultivation modes very similar to that explored by Eswaran and Kotwal (1986) based on credit market imperfections.

There are several interesting payoffs to using a general equilibrium approach, one being that it illustrates how landlords might be able to use other markets to resolve or evade property rights conflicts that were, by assumption, insurmountable in partial equilibrium models. This is an important consideration because many conflicts over property can in principle be resolved or evaded via market transactions, and a fundamental question to be resolved is what determines the choice between markets and conflict as mechanisms for land redistribution.

In some cases the anticipation of future property rights challenges by tenants or squatters will lead landlords to defensively suppress tenancy as a costly mechanism to protect property rights. This can lead to equilibria with highly distorted and inefficient agrarian structures. Under certain other circumstances however, the anticipation of property rights challenges can instead spur activity in the land sales market, with relatively few allocative efficiency consequences. In effect, a market develops for landlords to sell squatters' rights to tenants who will be in a better position to sustain ownership in future periods. We discuss several real world examples of such outcomes. The possibility of this type of Coase-like bargaining solution makes it clear that it is not the political threat of property rights reforms *per se* that leads to inefficient outcomes and conflict but

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[5]Bhagwati et al. (1998, Chapter 25) survey the literature on the effect of exogenous wedges or factor price differentials in general equilibrium trade models. de Janvry et al. (1991) explore some of the consequences of factor price wedges on farm household organization.

rather the threat of reforms coupled with the absence of other markets or mechanisms to facilitate bargaining and side-transfers between parties with competing claims.

When such mechanisms are costly or unavailable agents will be left with no option but to protect their property rights in costly ways, sacrificing economic efficiency by suppressing tenancy. Without well functioning markets for leased land to take advantage of the non-traded farming skills of small farmers, the model predicts the emergence of a sustained gap between land-to-labor ratios on landlord and peasant farms, lowered overall agricultural productivity, and migration of labor from rural areas to the city.

Our formal analysis leads to a number of other interesting predictions regarding the extent of tenancy across regions based on differences in factor endowments, the nature of crop technologies, the distribution of non-traded farming skills, pre-reform land inequality, and factors which influence the balance of political power in the countryside and the weight of urban workers in the electorate. It also yields a number of testable predictions about equilibrium pattern of land and labor use across farms within a region, and the effect of changing agrarian structures on wages and rural to urban migration.

In section 3 we present panel data evidence from India which provides tentative support for several of these results. India's 1949 Constitution left the adoption and implementation of land and tenancy reforms to the democratically constituted state legislatures rather than to the central government. The has resulted in a great deal of heterogeneity in the timing and depth of tenancy and property rights reforms across states. We exploit this observed heterogeneity to empirically study the joint evolution of tenancy rates and property rights reforms across states over a five-decade period. In particular we provide evidence that tenancy reforms, despite having been designed to protect tenants rights, actually reduced the extent of reported tenancy. We also find, in line with our model, that after controlling other variables including state and year fixed effects, the likelihood of reform increases when land inequality is higher, when the weight population weight of the urban sector is smaller, and when the political power of peasants, proxied in various ways, is greater.

The rest of the paper is organized as follows. The following section presents a brief literature review. Following that we present the basic model and analyses of the different political-economic equilibria that it implies. Section 3 discusses our empirical evidence from India. Section 4 discusses a number of historical episodes that appear to be consistent with the interpretations given here and Section 5 concludes.

2 Brief literature review

Our paper is related to several other literatures, in addition to the work of scholars noted above who have explored how the anticipation of exogenously imposed agrarian reform may reduce tenancy, and how actions can be taken to alter the stability of property rights. First, it builds on the existing work that has showed how market imperfections are crucial for explaining agrarian organization. Tenancy arises in our model arises because of imperfections in the market for non-traded farming skills. The nature of these imperfections determine not only the extent and benefits of tenancy under secure property rights, as in other standard models but also the size and economic costs of endogenous property rights insecurity.

Although there are literally hundreds of papers that have studied the choice of tenancy contracts in agriculture (for surveys see Bardhan, 1989 and Hayami and Otsuka, 1993) there are comparatively very few studies that have sought to explain differences in the *extent* of tenancy across regions either empirically or theoretically. The work of Bardhan (1979, 1984) is amongst the important early exceptions. Recent studies by Deininger et al. (1999), Lanjouw and Levy (2002), Macours et al (2004), Gine (2005) and others have raised awareness of the effects that insecure property title can have on the pattern and the extent of land lease transactions.

Several formal models, for example Grossman (1994), Horowitz (1993), and Acemoglu and Robinson (2001), have examined the incentive to redistribute land as a way of fore-stalling social conflict or revolution[6] and Alston, Libecap, and Mueller (1999) provide and important study of the determinants of violent conflict and land use on the Brazilian frontier. Our model differs from these in focusing on non-revolutionary politics and studying the joint determination of land reform and the organization of production in a setting with more general and standard assumptions about production technologies and the (potentially distorted) operation of markets for both land and labor. This allows us to examine trade-offs that these other studies had, by assumption, ruled out.

Finally, our research is also related to a large political economy literature which has stressed how inefficient decisions may arise to anticipate or manipulate future political equilibria. This research includes Persson and Svensson (1989), Alesina and Tabellini (1990), Aghion and Bolton (1990), and Besley and Coate (1998) in the context of democratic politics, and Robinson (1998) and Bourguignon and Verdier (2000) in non-

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[6]This view evidently also influenced policymakers and military strategists who have often placed land reform at the center of counterinsurgency plans in countries from Vietnam to El Salvador (Prosterman and Reidinger, 1987).

democratic polities. Apart from the different focus and motivation of our analysis, the fundamental theoretical difference is that in our model it is private agents and not political decision-makers who take actions that affect subsequent political outcomes.

Surprisingly few formal analyses of squatting or expropriation risk have considered the possibility analyzed in our model of the emergence of a market for squatter rights in which landlords might sell first claim to squatter rights access rather than wait for the outcome of a potentially costly conflict.[7] Such mechanisms appear undeniably important in practice. For example, Hernando de Soto's (1989) widely cited analysis of squatter settlements and informality points out that squatter land invasions in Peru and other parts of the world are often highly organized affairs. Prospective squatters often contract with intermediaries and organizers in advance to carefully delineate and often purchase prospective property rights in yet-to-be formed squatter communities. Landowners in peri-urban areas of Peru 'who foresaw imminent expropriation' under pending new agrarian reform legislation made agreements with squatter groups 'to organize the transfer of this land under the table and set up new informal settlements (p. 30).' The simple principle is that parties will often prefer to settle a dispute via cash side-payments or by the creation of a new property rights institution rather than choose the path of costly litigation or violence (Libecap, 1989). A particularly striking example of this occurring on a massive scale is provided by the events leading up to the South Korean agrarian reform of the late 1940s where, as discussed below, more than twice as much land was transferred to tenant farmers via 'voluntary' land sales by landlords on the eve of, and in full anticipation of, a radical agrarian reform, than would ever be transferred via the official reform process (Jeon and Kim, 2000).

3　The Model

3.1　Fundamentals

We consider a two-period society beginning in a pre-reform state. At the end of the pre-reform period there is an 'election' in which two office-motivated political parties compete for power by offering tenancy or agrarian reform.[8] The outcome of this electoral

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[7]A recent exception is Turnbull (2004) who independently analyzes the effect of allowing monetary transfers between landlord and squatter but in the considerably different context of a partial equilibrium strategic game setting.

[8]Our political model is closely related to the probabilistic voting model of Lindbeck and Weibull (1987), Dixit and Londregan (1996) and Persson and Tabellini (2000). For the sake of tangibility we talk only of elections. However, the model can also be interpreted in terms of a 'political contest' which

competition determines the probability (possibly zero) that a land-to-the-tiller or tenancy-reform will be implemented. In the event that such a reform takes place all sitting tenants will be given strengthened rights to the land they occupy and its output. In the case of land reform this can be interpreted as the transfer of property title, with or without compensation to landlords. In the case of a tenancy reform we can interpret this as protection from eviction and a reduction of land rents. Both types of reform can be analyzed within the same framework.

The production side is modeled using a variant of a two-sector general equilibrium Ricardo-Viner or Specific Factors model. There are two production sectors, rural and urban. The rural product is the numeraire consumption good and, for simplicity, we assume that the relative price urban goods measured in terms of agricultural goods $p = 1$ is fixed on world markets and assumed constant during the analysis. Homogenous labor is perfectly mobile across the two sectors. The urban sector produces output using a simple constant returns production technology $H(\overline{K}, L_u)$ where L_u is labor and $\overline{K}$ is a fixed stock of capital specific to that sector.

In the rural sector the good can be produced either on landlord or peasant farms. We assume that rural production requires an essential non-traded factor S, such as farming ability or skill, in addition to tradable inputs of land T and labor L. The production function $\widehat{F}(T, L, S)$ is subject to constant returns to scale, but since the non-traded factor is fixed to $S = \overline{S}$ on every farm, the restricted farm production function $F(T, L) = \widehat{F}(T, L, \overline{S})$ will be subject to decreasing returns to scale in land and labor.[9] Farm production will be carried out only by those households that possess some of the essential non-traded asset, and an efficient equilibrium will make operational farm sizes proportional to household holdings of the non-traded asset. This formulation offers a tractable and simple way to capture the idea that, for incentive reasons, residual claimancy status and production control rights should be offered to the owner of those inputs, such as farm management, that are most difficult to measure and monitor in the production process. This is the widely accepted primary explanation for the widespread prevalence of tenancy and the historical persistence of family-owned farms in many regions of the world (Hayami and Otsuka, 1993; Binswanger et al., 1995). Skoufias (1991) is one of many empirical studies to provide evidence of the central role that such non-traded factors

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is not democratic. As we noted in the introduction, dictatorships have implemented land reforms and dictatorships require popular support in the same way as democracies do.

[9]For example, in the Cobb-Douglass case $\widehat{F}(T, L, S) = T^{\rho_T} L^{\rho_L} S^{1-\rho_T-\rho_L}$. With $S = 1$ across all households, we have $F(T, L) = \widehat{F}(T, L, 1) = T^{\rho_T} L^{\rho_L}$ which is homogenous of degree $h = \rho_T + \rho_L < 1$.

play in determining the size of operational units and tenancy patterns in India.

We begin by assuming that both landlords and peasants have access to the same production technology $\widehat{F}$, and that, for this benchmark case, landlords and peasants also possess the same amount of non-traded assets which we normalize to $\overline{S}_p = \overline{S}_l = 1$. For notational convenience we indicate the landlords' (restricted) production technology by $G(T, L)$, even though for this benchmark setting $G(T, L) = AF(T, L)$ where $A = 1$. The consequences of allowing landlords to have a larger holding of the non-traded asset is easily accommodated[10] and will be discussed below.

The degree of homogeneity h of the restricted production functions F and G will be an important parameter. The lower the degree of homogeneity, the more pronounced are decreasing returns to scale with respect to the two traded factors T and L, and the larger the efficiency gain to organizing production around households that own the non-traded production factor S. With $h < 1$, efficient production will require the use of tenancy to match land use to the distribution of the non-traded factor across households.

There are $\overline{L}$ households in the economy with 1 unit of labor each. This will also be the total number of voters. Of these, $n^p \overline{L}$ are peasant households and $n^l \overline{L}$ are landlord households, where $n^p + n^l < 1$ and $n^p > n^l$. The remaining households are urban laborers or landless agricultural workers who do not possess (or cannot put to use) the non-traded farming skills necessary to become direct rural producers.[11] The total land endowment $\overline{T}$ will be allocated to satisfy demand T_p from each of the $n^p \overline{L}$ peasant farms and demand T_l from each of the $n^l \overline{L}$ landlord farms

$$\left[n^p T^p + n^l T^l \right] \overline{L} = \overline{T}$$

The labor force $\overline{L}$ will likewise be allocated between urban labor demand L_u and labor demand on peasant and landlord farms:

$$L_u + \left[n^p L^p + n^l L^l \right] \overline{L} = \overline{L}$$

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[10]If landlords and peasants differ only in their holding of non-traded S, landlords' restricted production function can be written as a homothetic expansion of the peasants' technology, or $G(T, L) = AF(T, L)$. For example, in the Cobb-Douglas case of the last footnote we would have $F(T, L) = T^{\rho_T} L^{\rho_L}$ and $A = \overline{S}_l^{1-\rho_T-\rho_L}$ where $\overline{S}_l$ is the landlords' non-traded asset holding and the peasants' holdings are normalized to $\overline{S}_p = 1$.

[11]In equilibrium there will always be $(n^p + n^l)\overline{L}$ farm units, although only $\overline{L} - L_u$ laborers in the farm sector, as portions of the farm household can migrate to the urban sector.

Dividing each by $\overline{L}$ these factor market equilibrium conditions can be rewritten as

$$n^p T_p + n^l T_l = \overline{t} \tag{1}$$

$$n^p L_p + n^l L_l = 1 - L_u / \overline{L} \tag{2}$$

where $\overline{t} = \overline{T}/\overline{L}$ is the economywide land to labor ratio.

Landlords as a class own fraction θ of the land endowment, or $\theta \overline{t}/n^l$ per landlord household. This implies each peasant household owns $(1-\theta)\overline{t}/n^p$ units of land. Since by definition a 'landlord' owns more land than a peasant, we must have $\theta > n^l/(n^p + n^l)$.

3.2 Production Organization with secure Property Rights

Peasant and landlord producers (indexed by $g = p, l$ respectively) each optimally chose T_g and L_g on competitive product and factor markets to maximize farm profits plus factor sales

$$\Pi^g(T_g, L_g) + w + v\overline{T}_g$$
$$= [F(T_g, L_g) - wL_g - vT_g] + w + v\overline{T}_g$$

where landlord and peasant household factor endowments are respectively $\overline{T}_l = \theta \overline{t}/n^l$ and $\overline{T}_p = (1-\theta)\overline{t}/n^p$ and both households have $\overline{L}_p = \overline{L}_l = 1$ unit of labor. Here v and w are market equilibrium land rent and labor wages. The familiar first-order conditions for a competitive equilibrium can be written

$$F_T = G_T = v \tag{3}$$

$$F_L = G_L = w = H_L \tag{4}$$

This system plus the factor balance equations (1)-(2) can be solved for T_l, L_l, T_p, L_p and L_u. Since by assumption all farm producers have the same technology and will face the same market input prices, in the benchmark case they will choose to operate farms of equal efficient scale, i.e. $T_p = T_l = T_e$ and $L_p = L_l = L_e$. Substituting T_e and L_e into (1) and (2) and solving we find

$$T_e = \frac{\overline{t}}{(n^p + n^l)}$$

$$L_e = \frac{\overline{L} - L_{ue}}{(n^p + n^l)\overline{L}}$$

Given the assumed technology and distribution of non-traded skills S, and secure property rights, the efficient equilibrium pattern of operational farm sizes is independent of the initial distribution of land ownership summarized by θ.

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The equilibrium level of labor allocated to the urban sector L_{ue} is determined implicitly by the condition that labor will migrate to or from the urban sector until the wage market is in equilibrium

$$F_L(T_e, L_e) = H_L(\overline{K}, L_{ue}) = w$$

Since all farms operate the same operational farm size, each landlord simply leases out all land in excess of this amount, and the efficient *share* of cultivated land under tenancy, or *efficient tenancy rate* τ will be given by

$$\tau_e = \frac{\theta \overline{T} - n^l \overline{L} T_e}{\overline{T}} = \theta - \frac{n^l}{(n^p + n^l)}$$

which rises linearly with θ.

Except for its richer predictions concerning the pattern of production organization in agriculture (since there are none in the usual constant returns to scale world), this is a Ricardo-Viner model with land and capital as specific factors in the rural and urban sectors respectively, and labor freely mobile across sectors. It is a standard result to show that a rise in the urban capital stock investment or an increase in the relative price of urban goods p will draw labor way from the agricultural sector, lowering the real market rental rate on land $v = F_T$, raising the nominal wage w. This will lead to overall less labor-intensive rural cultivation, but the size distribution of farms (i.e. how land $\overline{T}$ is allocated across farms) will remain unchanged. An increase in the total level of S in rural sector will draw labor from the urban sector, increase wages, and lower returns on specific capital. An increase in the non-traded factor S on landlord farms relative to peasant farms while leaving total S unchanged would lead to a new equilibrium with larger landlord and smaller peasant farm sizes and therefore less leasing out of land, but no change in the rural-urban labor allocation.

3.3 Property rights insecurity

We now extend the setting to allow the initial production period to be followed by a political contest that will decide the likelihood of future property rights reforms that may affect ownership claims in a final production period. In the pre-reform period households in group $g \in \{p, l\}$ will now choose factors of production as before except that they now are under the threat that a tenancy reform may occur with (possibly zero) probability α.[12]

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[12]Equivalently, we could think of reform as occurring with certainty, but then interpret α as a measure of its depth, for example as the fraction of land under tenancy that will fall under reform.

If a reform takes place all sitting tenants obtain protection from eviction on fraction $(1 - \kappa)$ of the land they leased in the pre-reform period and they will only have to pay a new capped rental rate $\overline{v}$ for those leases in the following period, where $\overline{v}$ will generally be set at or below the post-reform market equilibrium rental rate v^e. One interpretation of κ is that the reform beneficiary might have to pay monetary expenses $\kappa(v^e - \overline{v})$ per unit land transferred to cover such things as property registration paperwork, new taxes, excess loan financing costs, or other transaction or setup costs. The value of κ will be a key parameter establishing the size of the gap between the value of property rights lost by the landlord and the value of benefits transferred to the tenant or squatter.[13] Since in equilibrium the burden of this transaction cost will be reflected in land rent and sale prices and therefore shared between landlord and tenant it would not matter if we had instead imposed these transaction costs directly on the landlord.

To simplify matters it is assumed that no further alteration of property rights can take place after the reform. This implies that in the post-reform production period efficient resource allocation (T_e, L_e, L_{ue}) will be achieved at market factor prices $v^e = F_T(T_e, L_e)$ and $w^e = F_L(T_e, L_e)$, except of course that reform beneficiaries now earn additional incomes generated by the transfer of property rights.

We can model agrarian reforms of different type and depth by varying the three parameters $\alpha, \overline{v}$ and κ. For example, one may think of $\overline{v} = 0$ as expropriation without compensation to the landlord while $0 < \overline{v} < v^e$ could be thought of as a tenancy reform with a rent ceiling, or as a land reform with partial compensation. From a landlord's perspective a property rights reform means facing the prospect of being forced to cede the $(\theta \overline{t}/n^l - T_l)$ units of land they put under lease in the pre-reform phase at below-market rental rate $\overline{v}$ in the post-reform period. Anticipating this the landlord will now choose L_l and T_l (and hence also how much land to lease out) in a preemptive manner, considering the risk that tenants may become squatters or agrarian reform beneficiaries. Each individual landlord and peasant is assumed too small to internalize how their own production decisions might affect the subsequent political equilibrium and takes α as given.

Taking their conjecture of α as given, each landlord now chooses pre-reform factor inputs T_l and L_l to maximize the expected discounted value of farm profits plus factor sales taking into account that property rights over land leased out will be challenged in

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[13]Yet another interpretation is that κ is the fraction of tenanted land that 'leaks' to some third party beneficiary in the event of reform, for example to a another rural agent who mounts of legal challenge, or to a politically-connected government crony.

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the event of reform:

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\begin{aligned}
V^l &= \left[\Pi^l(T_l, L_l) + w + v\theta\bar{t}/n^l\right] \\
&\quad + \alpha\beta^l[\Pi^l(T_e, L_e) + w + v^e\theta\bar{t}/n^l - (v^e - \overline{v})[\theta\bar{t}/n^l - T_l]] \\
&\quad + (1 - \alpha)\beta^l[\Pi^l(T_e, L_e) + w^e + v^e\theta\bar{t}/n^l],
\end{aligned}
$$

where β^l is a time discount factor and $\Pi^l(T_e, L_e)$ are profits per farm in the post-reform period. Stated more compactly:

$$
\begin{aligned}
V^l &= \left[\Pi^l(T_l, L_l) + w + v\theta\bar{t}/n^l\right] + \beta^l[\Pi^l(T_e, L_e) + w + v_e\theta\bar{t}/n^l] \qquad (5) \\
&\quad - \alpha\beta^l[(v^e - \overline{v})(\theta\bar{t}/n^l - T_l)].
\end{aligned}
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The first line measures expected returns over the two periods under secure property rights while the last line captures the expected loss of income from having to possibly cede property rights to a squatter or reform beneficiary in the second period.

The peasant household will similarly choose T_p and L_p to maximize earnings from farm profits plus factor sales taking into account the prospect (summarized by α) that they may acquire squatter rights over any land that they leased in the first period. We assume that in a post-reform period a tenant has to pay only the regulated rate $\overline{v}$ but can lease that land back out onto the market, to earn a windfall rent of $(v^e - \overline{v})$ per unit land. The tenant's discounted expected payoff is therefore:

$$
\begin{aligned}
V^p &= \left[\Pi^p(T_p, L_p) + w + v(1-\theta)\bar{t}/n^p\right] + \beta^p[\Pi^p(T_e, L_e) + w^e + v^e(1-\theta)\bar{t}/n^p] \quad (6) \\
&\quad + \alpha\beta^p[(1-\kappa)(v^e - \overline{v})(T_p - (1-\theta)\bar{t}/n^p)].
\end{aligned}
$$

The first-order conditions for a competitive equilibrium with respect to first period land input choices are now given by:

$$
G_T + \alpha\beta^l(v^e - \overline{v}) = v = F_T + \alpha\beta^p(1-\kappa)(v^e - \overline{v}) \qquad (7)
$$

A landlord will lease out land until its marginal benefit v equals its marginal opportunity cost, measured as the sum of foregone first-period output on the landlord farm G_T plus the discounted expected cost of losing that land to a squatter the following period, $\alpha\beta^l(v^e - \overline{v})$. A peasant will lease in land until the marginal benefit, measured as the increased value of first-period output plus the discounted expected gain of property rights in the next period matches the marginal cost of leasing v. Re-arranging (7) and now including also

the first-order necessary conditions for optimal labor choices, the first-period equilibrium can be characterized by:

$$G_T(T_l, L_l) = F_T(T_p, L_p) - \alpha[(\beta^l - \beta^p) + \kappa\beta^p](v^e - \overline{v}) \tag{8}$$

$$G_L(T_l, L_l) = F_T(T_p, L_p) = H_L(\overline{K}, L_u) \tag{9}$$

The following mathematically obvious, yet intuitively slightly surprising result will be helpful to motivate later discussion:

Remark 1 *Even with a positive threat of property rights reform $\alpha > 0$, equilibrium allocations will remain efficient as long as $\kappa = 0$ and $\beta^l = \beta^p$.*

When there are minimal transaction costs or 'leakage' involved in transferring land and when landlords and peasants discount the future at approximately the same right (perhaps because peasants have access to easy financing) market allocations will be efficient even though there may be a positive probability (or even a certainty) that landlords will be compelled to surrender property rights to tenant-squatters in the following period. This can be seen trivially by noting that under these circumstances the first-order conditions above collapse to those of the efficient equilibrium (3)-(4). Conditions have emerged for the spurring of activity on a market where landlords in effect sell 'squatter rights' to tenants. Landlords will demand, and peasants will be willing to pay, an extra payment on top of the first period rental rate to compensate landlords for any expected future transfer of property rights. The threat of reform spurs the landlord to 'sell' (contingent claims to) his land in the first period rather than lease it out period by period, and allocative efficiency is maintained.

Landlords will however often not be in a good position to perfectly define and efficiently sell 'squatter rights' before reforms are enacted or their properties are 'invaded'. Even if they could, capital market imperfections preventing peasant access to funds (which would suggest one reason for $\beta^l < \beta^p$), as well as transaction costs and uncertainties associated with transferring exclusive property rights to the tenant-beneficiary (summarized by $\kappa > 0$) will make it difficult for a would-be peasant buyer to credibly commit to compensating landlords for the expected loss of property in the event of a reform or squatting. In these cases a positive wedge develops between tenants' and landlords' marginal valuation of land in (8), giving rise to the defensive and inefficient suppression of tenancy by landlords:

Proposition 1 *When $\kappa > 0$ and/or $\beta^l > \beta^p$, and as long as non-traded input S remains an essential input, then the expectation of reform ($\alpha > 0$) leads landlords to defensively*

suppress tenancy. Landlord farms will become larger and more land-intensive, and peasant farms smaller and more labor-intensive than the first best efficient scale. Peasant off-farm labor supply and rural to urban migration will increase.

Intuitively, landlords respond to the fear of squatters by limiting the amount of land they release to the lease market. They expand the size of their own farm operations (i.e. withhold land) up to the point where the marginal cost of further expansion equals what they can on the margin expect to recover from leasing out land under insecure property rights. The nature of this trade-off is shaped by the nature of the production technology. If S is not a necessary input then the production technology will be homogenous of degree one in land and labor and and hence there is no single efficient scale of farm production – all that can be pinned down in a competitive economy with constant returns to scale is the efficient land to labor ratio $T^e/L^e = \bar{t}$. There will then be no cost to suppressing tenancy and operating large farms. As long as the labor market remains open and competitive landlords can then react to the slightest indication of property rights insecurity by simply shutting down the land market entirely and then adjust labor hiring to reach the profit-maximizing and efficient land-to-labor ratio.

The more interesting and realistic case is when non-traded skills S are an essential input into production since there is then a first-best efficient operational farm size. Landlords must now balance the benefit of protecting property rights by withholding land from the market against the cost of operating the resulting inefficiently large farms. First-order conditions (8) and (9) capture this trade-off. When $\kappa > 0$ or when $\beta^l > \beta^p$ we have $\alpha[(\beta^l - \beta^p) + \kappa\beta^p](v^e - \bar{v}) > 0$ in expression (8) which establishes a wedge between the shadow price of land on peasant and landlord farms, $F_T > G_T$. Since labor mobility maintains $F_L = G_L = H_L$, we must therefore in equilibrium have $F_T/F_L > G_T/G_L$ implying that landlords will use more land-intensive production techniques, or $T_l/L_l > T_p/L_p$. Since landlords defensively withhold land their farms expand to inefficiently large scales, so $T_l > T_e > T_p$.

Since peasant land use falls, the marginal product of labor on peasant farms must also fall, leading peasant households to increase their off-farm labor supply $1 - L_p$. Some of this labor will go to the expanding landlord farms but some labor must migrate to the urban sector since the average marginal product of labor must fall in the now more inefficiently organized rural sector.

The proposition suggests why property rights insecurity might be partly to blame for often cited stylized facts about rural organization in Latin America, including bimodal

agrarian structures in which landlords operate inefficiently large and land-intensive land-lord farms alongside inefficiently small and labor-intensive small farms or minifundia, as well as the associated inverse-farm size productivity relationship, and high levels of rural to urban migration (Berry and Cline, 1979; de Janvry, 1981). A recent study by Macours et al. (2004) using empirical evidence from the Dominican Republic tests this implication directly by finding that the *gap* in land-to-labor ratios between farms that leased out land compared to farms that leased in land is higher in those communities with more insecure property rights, as proxied by a history of land conflicts.

Note that although property rights insecurity leads the observed rental rate of land to rise (reflecting the incorporation of an implicit 'squatter rights' premium included in the rental price), the equilibrium price at which landlords can *sell* land (or the value of owning land that will be leased out) has fallen relative to the first best equilibrium (unless $\kappa=0$ and $\beta^l = \beta^p$). This can be seen by noting that, starting from an efficient equilibrium, payment a tenant is willing to make to secure future "squatter rights" falls short of the landlords' expected property loss, since $\kappa > 0$. The expected present value of owning land by those who lease out land must therefore fall.

Comparative statics regarding the impact of changes in the conjectured value of α and other parameters can be derived straightforwardly from an analysis of the system given by (8)-(9) and the factor market balance conditions:

Proposition 2 *When S is an essential input, anything that increases the size of the wedge $\alpha[\beta^l - (1 - \kappa)\beta^p](v^e - \overline{v}) > 0$ will strengthen tenancy suppression and the results of Proposition 1. Ceteris paribus, equilibrium production organization will be affected as follows*

$$
\begin{array}{c|ccccc}
i = & \frac{\partial T_l}{\partial i} & \frac{\partial T_p}{\partial i} & \frac{\partial \tau}{\partial i} & \frac{\partial L_u}{\partial i} & \frac{\partial L_p}{\partial i} \\
\alpha, \kappa, (\beta^l - \beta^p), (v_e - \overline{v}) & + & - & - & + & +
\end{array}
$$

Several policy-relevant conclusions follow. For instance, policies that serve to improve conditions of credit market access (which can be thought of as lowering $(\beta^l - \beta^p)$), that improve compensation paid to landlords (raise $\overline{v}$ closer to v_e), that lower κ, or that lower the expected threat of reform α will increase first-period land rental market transactions and raise total output. A more egalitarian initial distribution of land (lower θ) is associated with higher economic efficiency and output because there will be less initial tenancy, and therefore less property rights under threat.

Although we have assumed a simple bimodal initial distribution of land ownership this can be readily generalized to allow for any initial arbitrary pattern in the distribution of

assets. Suppose for example that the economy had $\overline{L}$ households with each household i possessing $\overline{L}_i = 1$ units of labor and $\overline{S}_i = 1$ units of the non-traded factor as before but that now land ownership per household $\overline{T}_i$ were drawn from a more general land distribution function $g(\overline{T}_i)$, where total land owned still sums up to $\overline{T}$. It is easy to then demonstrate that property rights insecurity again leads to an endogenous stratification of farms into large and land-intensive landlord or 'large capitalist' farms that lease out land and hire in labor and tenant or 'laborer-cultivator' farms that hire out labor and lease in land. Now however there may also be an intermediate class of land-self-sufficient farmers – those with land ownership falling within a specified bracket– who will neither lease-in nor lease-out land. Some of these will be 'self-cultivators' who sell labor to the market while those with a bit more land may become 'small capitalists' who hire in labor but not land.[14] We can generalize further yet to allow any arbitrary joint distribution of owned factors $g(\overline{S}_i, \overline{L}_i, \overline{T}_i)$.[15]

Some readers may recognize the labels used to describe these different cultivation modes from Eswaran and Kotwal's (1986) classic analysis of equilibrium agrarian production organization. Our model is similar in structure to theirs. In both models two market imperfections are needed to generate an endogenous classification of economic classes. A key difference is that where Eswaran and Kotwal assumed imperfection in the market for supervised labor and credit, we focus on the non-tradability of certain farming skills (which can be interpreted as an imperfection in the market for labor supervision ability) and insecure property rights in the land lease market.

Up to this point we have taken the measure of property rights insecurity α to be exogenously given. The next sections endogenize this key variable by solving for the two-period political-economic equilibrium in such a manner that rational expectations of the political determined outcome α is determined jointly with equilibrium production allocations.

---

[14]More formally, households that own $\overline{T}_i < T'_p$ become 'laborer-cultivators' and operate farms with factor inputs (T'_p, L'_p), 'self-cultivators' and 'small capitalists' are those who own $\overline{T}_i \in \left[T'_p, T'_l\right]$ and choose $(\overline{T}'_i, L'_s(\overline{T}_i))$, while 'large capitalists' own $\overline{T}_i > T'_l$ and choose (T'_l, L'_l), where thresholds are defined as follows. (T'_p, L'_p) are defined implicitly by $F_T(T'_p, L'_p) = v + \alpha(1-\kappa)(v^e - \overline{v})$ and $F_L(T'_p, L'_p) = w$, (T'_l, L'_l) by $F_T(T'_l, L'_l) = v + \alpha(v^e - \overline{v})$ and $F_L(T'_p, L'_p) = w$, labor demand $L'_s(\overline{T}_i)$ is found by choosing $\overline{T}_i$ and hiring out or hiring in labor until $F_L(\overline{T}_i, L'_s) = w$, and where w and v are the factor prices that clear these two factor markets.

[15]This would generate two further class subdivisions since 'laborer-cultivators' or 'large capitalists' could now in principle be on either side of the labor market (e.g. a very skilled tenant might lease in both land and labor).

3.4 Political institutions

Potential property rights reforms are shaped via the political process. We shall model society's choices regarding the possibility and extent of reforms as the outcome of a democratic electoral competition process. As we noted in the introduction however, the same forces will be at work in non-democratic polities. To fix ideas, we first analyze the case of electoral competition within the context of a probabilistic voting model, but then explain how the essential trade-offs of the model would be adapted to other models of political competition.

Assume that there is one vote per-agent. Two political parties, which we denote A and B compete to capture these votes. We assume that both parties have the sole objective of maximizing the probability of winning the election. There is a single policy issue or instrument which is $\alpha \in [0, 1]$, the probability of reform. The idea simply is that party platforms represent different levels of commitment to implementing reform, and higher levels of commitment make reforms more likely. We assume, however, that a higher probability of property rights reforms imposes costs on society (such as social tensions or violent conflict leading up to reform, or disorganization costs in the wake of reforms). We model this simply by assuming reform level α imposes expected costs $C(\alpha)$ on each agent. We assume C is strictly increasing and convex with $C(0) = 0$, $C' > 0$, $C'' > 0$ and $C''' \leq 0$ to capture the idea that conflict or disorganization costs rise quickly with more radical and far-reaching reforms. The assumption that C is the same across all groups is adopted mainly as a shortcut to simplify expressions[16] and the convexity assumption mainly to express the political contest outcome as a conveniently differentiable function.

Since urban voters do not benefit from reform, but bear costs, they strictly prefer $\alpha = 0$. Peasants are the only group that potentially prefers $\alpha > 0$. Landlords preferred policy may actually be a value $\alpha \leq 0$ or what might be thought of as a 'land grab' in which they seize peasant lands. To stay focused on the issues at hand we shall however make assumptions such that political parties never offer such policies, so that in equilibrium outcomes are constrained to $\alpha \geq 0$. The equilibrium extent of reform depends on how the political system aggregates the preferences of different groups. Note that in an ex-ante peasants are harmed by the prospect of property rights reforms, once they are sitting tenants it becomes individually rational for a tenant to vote for reform at the end of the

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[16]The assumption that urban agents incur costs captures the idea that the costs of agrarian reform spill over into the cities. This could be because the government has to raise taxes to finance reforms, because reform induces higher food prices, or perhaps because focusing policy on the rural sector has opportunity costs in terms of spending in the urban sector.

first period.

Let $V^g(\alpha_x)$ be the indirect utility of an agent of group $g \in \{l, p, u\}$ as a function of the extent of reform offered by party $x \in \{A, B\}$. We assume that every voter has an aggregate ideological bias in favor of party B of δ and but that each also has an individual specific bias of σ^{ig}. Thus an agent of group g votes for party A if the indirect utility he gets from the policy platform of party A is greater than the indirect utility from the policy of party B plus the ideological biases,

$$V^g(\alpha_A) - C(\alpha_A) > V^g(\alpha_B) - C(\alpha_B) + \sigma^{ig} + \delta.$$

We assume that σ^{ig} is distributed uniformly on the interval $\left[-\frac{1}{2\phi^g}, \frac{1}{2\phi^g}\right]$, and that δ is uniformly distributed on the interval $\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right]$. We can therefore calculate the critical value of the idiosyncratic bias which leaves an agent indifferent between the parties. This is,

$$\widehat{\sigma}^{ig} = V^g(\alpha_A) - C(\alpha_A) - (V^g(\alpha_B) - C(\alpha_B)) - \delta. \tag{10}$$

All agents of group g with $\sigma^{ig} \leq \widehat{\sigma}^{ig}$ vote for party A. The total number of agents in group g that vote for party A is therefore,

$$n^g\overline{L} \int_{-\frac{1}{2\phi^g}}^{\widehat{\sigma}^{ig}} \phi^g di = n^g\overline{L}\left(\widehat{\sigma}^{ig} + \frac{1}{2\phi^g}\right)\phi^g$$

This follows because, for given δ, A gets the votes of all the agents of a group who have low values of σ^{ig}. The probability that party A wins the election, denoted $\chi(\alpha_A, \alpha_B)$, is therefore the probability that the total number of votes it gets is at least one half of the population, or,

$$\chi(\alpha_A, \alpha_B) = \Pr\left\{\sum_g n^g\phi^g\overline{L}\left(\widehat{\sigma}^{ig} + \frac{1}{2\phi^g}\right) \geq \frac{\overline{L}}{2}\right\}$$

Integrating out over the support of δ, using standard calculations and substituting for $\widehat{\sigma}^{ig}$ using (10) we find,

$$\chi(\alpha_A, \alpha_B) = \frac{1}{2} + \frac{\psi}{\phi}\sum_g n^g\phi^g\left(V^g(\alpha_A) - C(\alpha_A) - (V^g(\alpha_B) - C(\alpha_B))\right),$$

where $\phi = \sum n^g\phi^g$. The probability of winning is a simple weighted sum of the utility differences that the policy platforms of the parties induce.

A pure strategy Nash equilibrium between the parties is a pair of platforms $(\widetilde{\alpha}_A, \widetilde{\alpha}_B)$, such that

$$\widetilde{\alpha}_A = \arg\max_{\alpha_A \in [0,1]} \chi(\alpha_A, \widetilde{\alpha}_B),$$

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while

$$\widetilde{\alpha}_B = \arg \max_{\alpha_B \in [0,1]} \ 1 - \chi(\widetilde{\alpha}_A, \alpha_B).$$

By symmetry, a Nash equilibrium between the parties involves $\widetilde{\alpha}_A = \widetilde{\alpha}_B = \widetilde{\alpha}$, where $\widetilde{\alpha}$ satisfies the first-order condition,

$$\sum_g \eta^g \left(V_\alpha^g(\widetilde{\alpha}) - C'(\widetilde{\alpha}) \right) = 0. \tag{11}$$

where $\eta^g = n^g \phi^g$ and where V_α^g denotes the partial derivative of V^g with respect to α. This first-order condition is seen to be a weighted average of the first-order conditions that determine the preferred policy of each group. The weight η^g given to each group's preferences is proportional to that group's population share of the vote, but is also affected by ϕ^g, which is the density of the ideological shocks σ^{ig}. Groups with relatively larger ϕ^g will have more influence in determining the equilibrium policy put forward by political parties because such groups will contain more 'swing voters.'

Many other models of political competition can be boiled down to an equilibrium condition similar to (11). For example, the simplest median voter model assigns $\eta^g = 1$ to the group which contains the median voter and $\eta^g = 0$ to all other groups. As discussed below interesting equilibria with a positive probability of agrarian reform will arise within the context of this model only when the peasant group is able to achieve sufficient 'political clout' to attract the attention of political candidates. More generally, reform will only emerge within any political system that gives sufficient political weight to the peasant sector's preferences.

3.5 Determinants of reform

The timing of the game is as follows

- Landlords determine the extent of first-period tenancy.

- The political parties simultaneously and non-cooperatively determine their plat-
  forms.

- First period production, consumption and voting take place.

- The outcome of the election is determined and property reform is implemented[17]

---

[17]Since the political parties only care about the probability of winning and not the actual policy they adopt it is weakly optimal for them to actually choose the α they promised. We therefore abstract from issues of commitment to policy. In an earlier version of this paper we showed how this assumption could be relaxed.

with probability α.

There are three groups $g = p, l, u$. Since the size of the urban population is determined endogenously we have to specify how people who migrated from the countryside vote. One simple idea is that those that migrate to the city remain loyal to the rural household they left behind. Voting bloc shares would then remain fixed even as the urban population increased through migration. An alternative assumption is that the urban voting bloc grows as L_u expands. In that case we might have voting shares adjust endogenously to

$g =$	(p)easants	(l)andlords	(u)rban
	$\frac{(\bar{L}-L_u)}{\bar{L}} \frac{n^p}{(n^p+n^l)}$	$\frac{(\bar{L}-L_u)}{\bar{L}} \frac{n^l}{(n^p+n^l)}$	$\frac{L_u}{\bar{L}}$

where we assume for simplicity that rural to urban migration scales down peasant and landlord households proportionately. We shall work with the first simpler assumption below because it greatly simplifies the math of the comparative statics analysis that follows. Clearly the assumption that anti-reform voting bloc size increases with migration will lead to slightly less reform in equilibrium. The difference between the two cases is not likely to be large however because rural to urban migration occurs only to the extent that tenancy suppression lowers the average product of labor in the agrarian sector, and this effect need not be large.

The payoff to a voter in group g is $V^g(\alpha, T_g, L_g) - C(\alpha)$ where $V^g(\alpha, T_g, L_g)$ is defined in (5) and (6) for landlords and peasants respectively. For urban workers $V^u(\alpha) - C(\alpha) = w + \beta^u w^e - C(\alpha)$. Using the fact that the area leased per peasant $T_p - (1-\theta)\bar{t}/n^p$ in (6) can be rewritten $\theta\bar{t}/n^p - n^l T_l/n^p$, and the envelope theorem, expressions for V_α^p and V_α^l can be written as follows

$$
\begin{aligned}
V_\alpha^p(\alpha) &= \beta^p(1-\kappa)(v^e - \bar{v})\left(\frac{\theta\bar{t}}{n^p} - \frac{n^l T_l}{n^p}\right) \\
V_\alpha^l(\alpha) &= -\beta^l(v^e - \bar{v})\left(\frac{\theta\bar{t}}{n^l} - T_l\right) \qquad (12) \\
V_\alpha^u(\alpha) &= 0
\end{aligned}
$$

We can now use (11) to calculate the equilibrium policy adopted by the political parties for a given level of tenancy (as captured by T_l) and other parameters, denoted $\alpha(T_l, L_u, \theta, \boldsymbol{\eta})$, where $\boldsymbol{\eta} = (\eta^L, \eta^P, \eta^U)$. Substituting for each of the V_α^g into (11) under the assumption that migrants maintain loyalty to their original household, we can re-arrange to obtain:

$$\left(\phi^p \beta^p (1 - \kappa) - \phi^l \beta^l\right) \left(\theta \bar{t} - n^l T_l\right) \left(v^e - \overline{v}\right) = C'(\alpha). \tag{13}$$

This equation shows that the equilibrium amount of land reform, $\alpha(T_l, \theta, \boldsymbol{\eta})$, will be a weighted function of the marginal effects of land reform on the utilities of different voters. For there to be any agrarian reform at all requires

$$\phi^p \beta^p (1 - \kappa) > \phi^l \beta^l \tag{14}$$

which will only occur if ϕ^p is sufficiently larger than ϕ^l. This requires that the peasant sector have more political clout than the landlord sector, a condition that is not always likely to be met, even though peasants are a larger proportion of the electorate than landlords.

Let's assume this condition holds. At the outset of the election production decisions and therefore T_l and L_u are pre-determined. *Ceteris paribus*, anything that raises the left hand side of (14) must lead to an increase in the equilibrium level of α chosen by the political system:

$$
\begin{array}{lll}
\frac{\partial \alpha}{\partial T_l} \leq 0 & \text{Reform rises the larger the total area under tenancy} \\
\frac{\partial \alpha}{\partial \theta} \geq 0 & \text{Reform rises the more unequal the initial distribution} \\
\frac{\partial \alpha}{\partial \kappa} \leq 0 & \text{Reform falls the higher the leakage} \\
\frac{\partial \alpha}{\partial \phi^p} \geq 0 & \text{Reform rises the more organized are peasants} \\
\frac{\partial \alpha}{\partial (v^e - \overline{v})} \geq 0 & \begin{array}{l} \text{Reform rises with the expected value of the rent cap} \\ \text{(i.e. higher } v^e \text{ and/or lower } \overline{v}) \end{array}
\end{array} \tag{15}
$$

3.6   Political-economic equilibrium

Having solved for both the political determinants of reform and the allocation of resources in the second period, it remains to determine the equilibrium amount of first-period tenancy. Noting the dependence of α on past organization decisions via the political process, landlord's first-period expected returns can now be written

$$\max_{T_l, L_l} \ V^l(\alpha(T_l, L_l, \theta, \boldsymbol{\eta}), T_l, L_l) - C(\alpha(T_l, L_l, \theta, \boldsymbol{\eta})) \tag{16}$$

Two polar-opposite cases of landlord behavior will be distinguished: (a) the atomistic or non-cooperative case where landlords take the value of α as given and outside of their individual control ($\partial \alpha(.)/\partial T_l = 0$), and (b) the 'collusive' case where landlords are able to coordinate and internalize the effect of each others' choice of T_l on the equilibrium α. Intermediate cases where landlords choose T_l in non-cooperative fashion on imperfectly competitive markets can also be analyzed, but resulting equilibrium choices will always be

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bracketed by these two polar cases. Although the case where landlords take the decisions of other landlords as given and act non-cooperatively is the more realistic, and the main focus of our analysis, it is nonetheless also useful to study the collusive case as it clarifies the nature of externalities across landlords in the protection of property rights that arise in the non-cooperative setting.

Differentiating (16) with respect to T_l the first-order condition for the colluding land-lord optimum can be written:

$$V_{T_l}^l + \alpha_{T_l}(V_\alpha^l - C') = 0 \qquad (17)$$

The first term $V_{T_l}^l = [G_T - v] + \beta^l \alpha(v^e - \overline{v})$ can in turn be decomposed into two sub-components. The term in square brackets is the first period direct production cost of increasing land under own cultivation (i.e. suppressing tenancy) under the assumption that the property rights are secure ($\alpha = 0$). This effect will be more pronounced, the more important is the role of the non-traded factor, since this determines the efficiency cost of expanding landlord production beyond the efficient scale. The next sub-component measures the expected future value that landlords stand to protect from a small increase in the amount of land withheld from tenants also under the assumption that the probability of reform remains unchanged. The next term $\alpha_{T_l}(V_\alpha^l - C')$ in (17) measures the effect of increased property rights security if *all* landlords were to raise T_l simultaneously. This term is non-negative since by an earlier result, the equilibrium amount of reform is non-increasing in T_l (i.e. $\alpha_{T_l} \leq 0$) and because landlords always want less reform than a political equilibrium that gives any weight to peasant demands, so we must have $(V_\alpha^l - C') \leq 0$. We denote the collusive solution to (17) by (T_l^c, L_l^c) and the atomistic solution by (T_l^a, L_l^a). It is then easy to see that:

Remark 2 *There will be less tenancy suppression $(T_l^a < T_l^c)$ and more reform $(\alpha^a > \alpha^c)$ when each landlord acts non-cooperatively, not internalizing the potential effect that their increase in tenancy has on the overall property rights security compared to an economy where landlords could coordinate their actions.*

When each landlord acts atomistically, not internalizing the effect that their increase in tenancy has on property rights security of other landlords, we would set $\alpha_{T_l} = 0$ and first order condition (17) simply becomes $V_{T_l}^l = 0$ or

$$[G_T - v] + \beta^l \alpha^a(v^e - \overline{v}) = 0.$$

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where α^a is a landlord's conjecture about the probability of reform. This is the same first-order condition as (7) and so our earlier analysis of how first-period equilibrium production organization responds to any given level of α will be useful. A political-economic Nash equilibrium (T_l^a, L_l^a) also requires equilibrium in the labor market, $G_L = F_L = H_L$ and that conjectures turn out to be consistent with the political equilibrium from (11), or $\alpha^a = \alpha(T_l^a, L_l^a, \theta, \boldsymbol{\eta})$. As long as conditions are met for an equilibrium $\alpha^a \geq 0$ then we must have $T_l^a \geq T_e$. Landlords will restrict tenancy because they expect reforms and squatter rights cannot be perfectly traded in a parallel market.

Each landlord restricts tenancy concerned only about limiting potential loss of their own property in the event of reform, but unconcerned about how leasing out an extra unit of land might increase property rights insecurity for other landlords by augmenting the political chances of reform α. To see how landlords as a group would act to internalize this externality we have to also make an assumption about the behavior of peasants. Since peasants are in general a more numerous group, the simplest and most plausible assumption is that peasants treat α as given. When this is the case their first-order condition determining T_p and L_p will be as before in (7). First period equilibrium production decisions will now be characterized by the factor market balance equations and conditions:

$$
\begin{aligned}
G_T &= F_T - \alpha[(\beta^l - \beta^p) + \kappa\beta^p](v^e - \overline{v}) - \alpha_{T_l}(V_\alpha^l - C') \qquad (18) \\
G_L &= F_L = H_L = w
\end{aligned}
$$

which are very similar to (8) and (9) except for the last term on the right of (18). It follows immediately that $T_l^c > T_l^a$ and landlords suppress more tenancy when they can coordinate their actions. To see this note that (18) can be written compactly as $G_T = F_T - X$ and anything that increases X increases equilibrium T_l.[18] Since as argued earlier $\alpha_{T_l}(V_\alpha^l - C') \geq 0$ in the collusive case and zero in the atomistic case, X and therefore T_l must be larger when landlords collude. When a landlord decreases T_l (increases tenancy) he imposes a negative externality on all other landlords. When landlords can coordinate their actions, they take this effect into account and thus increase T_l further above the non-cooperative case.

Even though tenancy is efficient from an economic point of view, the anticipation of property reforms limits its scope. This effect is greater, (1) the less are the efficiency

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[18]Suppose otherwise, so T_l falls. Land market equilibrium would then require T_p to rise, but then $G_L = F_L$ can only be maintained if L_p falls relative to L_l. But that would lead F_T to fall relative to G_T, an obvious contradiction since the gap between F_T and G_T needed to expand to accomodate the rise in X.

losses from reducing tenancy (h closer to 1), (2) the greater is initial land inequality θ, (3) the more political weight of peasant interests in the political process (ϕ^p). Deriving exact analytic expressions for comparative static results is algebraically tedious, but can be intuitively motivated. We therefore turn our attention to examining what hypothesized relationships can be found in data. Of particular interest is the effect of greater land inequality θ on the equilibrium extent of tenancy. There are two expected effects. The first direct effect is that under secure property rights higher land inequality θ should lead to a higher level of area under tenancy. The second is the indirect political effect of higher θ on the likelihood of political reform α when condition (14) is met. By (12) a higher level of θ raises $(V_\alpha^l - C')$ in (18), so tenancy suppression rises with θ via this political channel. Intuitively, the larger the properties of landlords the more they stand to lose from property reforms (as seen by 12) and therefore the more costly measures they will take to protect their claims (either individually or as a class if they could coordinate). In the empirical section we seek evidence for this and other hypothesized relationships.

4   Tenancy and property rights reforms in India

India provides a unique historical setting within which to explore the empirical relationships between production organization, politics, and property rights reforms. By the time India achieved independence in 1947 the demand for land and tenancy reforms had been raised to a burning political and economic issue. Over the next few decades India passed what is arguably "the largest body of land reform legislation ever to have been passed in so short a period in any country (Besley and Burgess, 2000)." What is particularly interesting for our purposes is that the 1949 Constitution left the adoption and implementation of land and tenancy reforms to democratically elected state legislatures. This has lead to a great deal of variation in the timing of reforms that can help us to identify the processes behind the joint evolution of tenancy rates and property rights reforms. While some other empirical studies have tried to explain differences in the extent of tenancy across Indian states using cross-sectional data from earlier periods (Bardhan, 1979, 1984; Laxminaryan and Tyagi, 1977) ours is the first study we are aware of that examines this question with panel data and including political variables.

Table 3 reports *Tenancy* rates – the fraction of cultivated land under any form of land tenancy – in each of sixteen rural states for the years that comparable data across states was collected by India's National Sample Survey Organization (NSSO).[19] From 1954 to

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[19] Tenancy refers to land leasing including sharecropping, fixed rent tenancy and other forms. Tenancy

1992 the reported share of cultivated land under tenancy fell sharply, but unevenly, across all states. Particularly steep declines were recorded in Assam, Maharashtra, Kerala, Jammu and Kashmir, Punjab, Tamil Nadu, and West Bengal each of which experienced 50 to 90 percent declines in the measured extent of tenancy. At the same time tenancy reforms were being enacted in different states. The question to be addressed here is whether, after controlling for other factors, these changes may be systematically related to changes in political and economic variables in line with the predictions of the theory.

Several observers have pointed out that survey respondents may be under-reporting tenancy to elude tenancy regulations, in which case part of the measured decline may be due to the rise of disguised tenancy (Bardhan, 1979; Bliss and Stern, 1982; Ray, 1998). While this is almost certainly the case, there is no obvious method with which to consistently control for this measurement problem across states. The analysis therefore can only purport to explain movements in *reported* tenancy rates. If reported tenancy fell more rapidly than actual tenancy, the empirical relationship between tenancy reforms and area cultivated under tenancy will be overstated. Even so the analysis remains useful as an indication of the costs of insecure property rights because actual and reported tenancy rates likely move together and because agents who spend effort and resources to conceal tenancy are also very likely making other costly choices to evade or adapt to actual or anticipated tenancy legislation.

Tenancy reforms in India have focused on three main areas: (a) rent ceilings; (b) granting of long-term security from eviction to tenants; and in a some cases (c) the granting of ownership rights to tenants. Specific regulations and implementation have varied by state. Table 3 reports two proxy measures of cumulative property rights reform by the end of sample year 1992, both taken from Besley and Burgess (2000). The first of the two is the cumulative index of tenancy reforms ($Clr1$) which aggregates the number of significant tenancy reform acts, or major revisions to tenancy law, that had occurred in a particular state up to any given date.[20] This is an admittedly crude proxy of property rights insecurity particularly since it cannot very well capture the intensity or the extent to which policy was actually implemented across states. Besley and Burgess have nonetheless demonstrated that this variable can account for significant differences in growth and poverty outcomes across states. A second broader measure of reforms (Clr)

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data for 1954 and 1961 are from the NSSO as reported by Bardhan (1976). Later years are taken from the tables in the NSSO's *Sarveshana* journal (various issues). We focus on the same 16 states studied by Besley and Burgess (2000) with the exception of Haryana (which split from Punjab in 1965) because of missing observations.

[20]Our variable naming conventions follow those found in the Besley and Burgess (2000) dataset.

is also reported. This variable simply adds up all major agrarian reform acts including tenancy reforms as well as reforms to impose land ownership ceilings, abolish *Zamandari* intermediaries, or consolidate lands. We have combined the state-level observations of tenancy rates by decade that we obtained from the NSS with the annual dataset of political and economic variables that Besley and Burgess (2000) constructed from NSS and other sources. Setting aside a few missing observations, we are left with a panel of fifteen states with usable tenancy observations in 1961, 1972, 1982 and 1992.[21]

There seems to be fairly general agreement that agrarian reforms in India have been relatively modest in their impact on the patterns of land ownership inequality in India (Besley and Burgess, 2000; Mearns, 2000; Ray, 1996). This is partly because many reforms were aimed from the outset at offering tenurial security and rent regulation rather than the transfer of full property ownership. Reforms that did have the aim to redistribute land ownership, such as those associated with land ceiling legislation, were typically only weakly enforced. Table 3 shows that although the land Gini coefficients have on average declined across states between 1961 and 1992, with the exceptions of Kerala and Assam, these declines have been overall modest in most states.

The theoretical model suggests estimating how the area under tenancy τ_{is} in state s in time period i responds to economic variables x_{si} that directly affect tenancy choices as well as with agents' expectation of future property rights reforms R_{si+1} (the expected probability of reform α in the earlier model) which is also treated as endogenous. Our empirical estimation strategy closely mimics the framework that Besley (1995) used to analyze the relationship between property rights over land and investment choices by rural households using plot-level data from Ghana. The key differences are that we study state-level tenancy choices rather than plot-level capital investment decisions and property rights insecurity is proxied here by the cumulative agrarian reform index. The relationships to be modeled may be represented compactly as

$$\tau_{si} = f(R_{si+1}, x_{si}, z_i) \tag{19}$$

$$R_{si+1} = g(\tau_{si}, x_{si}, z_i, R_{si}) \tag{20}$$

Tenancy choices τ_{si} in state s in time period i depend on a vector of state and time dependent variables x_{si}, time-invariant state variables z_i, and agents expectations about

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[21]Tenancy rates for 1954 are also reported in the table but could not be used in the regressions due to our not having comparable data on several of the other variables going far back enough to enter the regression with lags.

future property rights R_{si+1}. Since we cannot directly observe agents expectations about property rights in time period i we follow Besley's approach and reasoning in assuming that they are formed rationally conditioning on all variables in agents information sets including the current state of property rights R_{si} as well as other current or past economic and political variables including x_{si} and z_i: With this and simplifying assumptions about linear functional forms we can arrive at the following linear specification for the tenancy equation, essentially identical in form to Besley's (1995) equation (19):

$$\tau_{si} = a_1 x_{si} + a_2 R_{si} + a_3 z_i + a_4 w_i + \varepsilon_{si}$$

To control for unobserved heterogeneity in the time invariant state-level variables that could bias the results we will include state level fixed effects in most of the specifications. We also control for any India-wide time effects by including year (decade) dummies. To control for the endogeneity of reform we will report limited information estimates of the above equation instrumenting for R_{is} using political and population variables that are likely to be correlated with R_{is} but not directly with tenancy. Because estimating an instrumental variables regression with both state and year fixed effects demands a lot of such a small dataset, the results below should be interpreted with caution.

Our main hypotheses are that expected reforms should have a negative and statistically significant impact on the extent of tenancy even after controlling for the endogeneity of reform and other variables. We also expect higher land inequality should have a direct effect of leading to more tenancy, but that it may lower tenancy indirectly via its impact on a higher probability of reform. We capture the pattern of landholdings using the land *Gini* (calculated to include households with no land) and its square (*Ginisq*), as well as by *Noland*, the fraction of rural households that own no land. Although this last variable may be thought as related to one component of the land Gini, we expect it to be of independent interest, for example if the landless behave differently politically than smallholders. Taken together these variables allow for a flexible range of relationships between land distribution and the endogenous variables of interest. We expect tenancy to increase with the land Gini in a state, as markets work to bring operational farm sizes more in line with the distribution of farming skills (which one expects to be less concentrated than land ownership). On the other hand, land inequality could have an indirect negative effect on tenancy via the expectation of reforms, if the political process is such that the demand for reform rises with land inequality or with the fraction of the population owning no land.

Table 4 presents estimates of the equations of interest using three different estimation strategies. Column 1 reports results from a simple OLS regression of (19). None of the coefficients are significant, but these estimates are almost certainly biased for failing to control for unobserved heterogeneity across states. The second column presents an OLS regression with state fixed effects to control for time-invariant factors such as differences in soil and geography, characteristics that would explain initial differences in the level of tenancy across states in a single cross-section (Bardhan, 1979). Tenancy is now found to fall with expected reform activity and rises with the fraction of landless in the population. Since we are not controlling for the endogeneity of reform the estimates are however still likely to be inconsistent.

Column 4 addresses the endogeneity issue via an instrumental variables approach. Recall that in the probabilistic voting model the more ideologically homogenous a voting bloc is, the more power they have to move the political equilibrium. Factors that influence the strength and size of the coalition in favor of reform will therefore be important determinants of the extent of reform. Though ideological homogeneity cannot be observed directly we conjecture that one reasonable proxy of political fragmentation is how many candidates compete for each political seat in a given state. The presence of many candidates is a sign of political competition, but also of greater ideological heterogeneity in the peasant bloc. In line with the theory we also postulate that the larger the share of the urban sector in the state population, the less strength for a political coalition in favor of far-reaching property rights reforms in the rural sector. This discussion suggests our choice of two instruments in the cumulative reform index equation. One instrument is $Urban$, the fraction of the population in non-rural areas and the other is $Candpseat$, the number of political candidates competing per seat in the most recent state elections. To address concerns that either of these variables might themselves be endogenous we have used a ten year lag for each. Both instruments are expected to influence the political outcomes that determine property rights reforms yet should not have a direct impact on farmer tenancy decisions.[22]

The third column or the table presents the results of our two-stage least squares estimates.[23] The coefficient on the key variable of interest $Clr1$ is negative and statistically

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[22]We tried various additional instruments suggested by Besley and Burgess (2000). These are lagged values of the shares of legislative seats that went to (1) the 'hard left', (2) Congress Party and allied parties, and (3) 'Hindu parties'. When these instruments were used alongside our own the result was to leave $clr1$ largely unchanged and still significant, yet by themselves the new instruments fail the test of joint significance in explaining $clr1$.

[23]This provides a consistent single-equation method for estimating equation (19). We also ran a three-stage least squares estimation of the two equation system (19)-(20). The results are not reported but

significant as expected, with a p-value of 0.06. Since ours is, arguably, a one-sided hypothesis, the coefficient would be considered significant at the 3 percent level on a one-tailed test. This indicates that after controlling for other effects each additional legislative act of tenancy reform reduces the tenancy rate by about 1.4 percentage points. Since the cumulative tenancy reform index ranges from 0 to 9 over this period, this accounts for up to almost 13 percentage points of decline. This likely underestimates the true impact of expected property rights reforms on reported tenancy since reform in any one state may influence landlords expectation of reform in another state.[24] A higher land Gini in a given state leads to higher levels of tenancy – as one would expect land markets would do. The estimated quadratic relationship suggests that land inequality increases tenancy in a state up to a land Gini of approximately 65 (on a scale of 100) at which point the relation levels off and then declines. Land inequality could of course also influence tenancy indirectly, via its effect on the probability of reform, although as the following discussion suggests, this appears to be a rather muted effect.

The bottom panel of column 3 reports the first-stage IV regression results. The instruments easily pass tests of their validity as instruments as indicated by an F-statistic test that shows they are jointly significant at explaining the instrumented variable, and Sargan's test of overidentifying restrictions suggests we cannot reject the null that the instruments are uncorrelated with the second stage disturbance. Unlike the tenancy regression, this is a reduced form. The signs of the coefficients correspond to those of the underlying linear structural equation, but the absolute size of the coefficients will differ. As expected, the coefficient on $Urban$ is negative and statistically significant, indicating as expected that more urban electorates are less likely to vote for tenancy reforms. The coefficient on $Candpseat$, is also negative and statistically significant, suggesting perhaps that states with more political party fragmentation have fewer tenancy reform acts.[25]

Our measures of the direct impact of land inequality on tenancy rates also have the

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were, not surprisingly, virtually identical coefficient estimates of (19). Greene (2000, Chapter 16) provides a relevant discussion.

[24]To properly take into account such interaction effects across states would be infeasible with a dataset this small.

[25]A recent study by Bardhan and Mookherjee (2005) uses village-level data to explore political determinants of land reform activity in West Bengal. They find that land reform activity is highest where 'hard left' parties hold a larger number of legislative seats *and* those parties also faced significant political competition. We explored these effects by adding lagged values of *hardleft* (share of state seats controlled by hard left parties as defined in Besley and Burgess (2000) and *hardleft* interacted with *candpseat* as instruments to the *clr1* equation. Consistent with their story the interaction term was positive (hardleft matters when there is more competition) but the result was not statistically significant with our statel level data (p-value 0.19).

expected signs. A higher land Gini does not appear to affect the index of reform in a very significant manner, but a larger number of landless in the population (many who would likely be tenants) appears to increase the demand for, and extent of tenancy in a given state in a small but statistically significant manner.

It's interesting to note that after controlling for other factors the time dummies have no significant direct effect on tenancy levels but do show up significantly in the first-stage reform equation. This suggests that any India-wide trend appears to work its way to lower tenancy mainly via rising reform legislation.

Although we have focused narrowly only the effect of expected tenancy reform acts, the expected enactment of other land-related reforms could also be interpreted as a harbinger of future property rights challenges. To examine whether this is the case, and to check how robust the estimates are to changes in how reform is measured, column 4 presents results for the regression using Besley and Burgess' broader measure of agrarian reform activity Clr, which includes both $Clr1$ as well as other agrarian reform legislative acts. The results are broadly very similar to the earlier ones. Not surprisingly, state tenancy rates are less responsive to each additional act of reform compared to when we considered just tenancy reforms.

5   Further Discussion and Evidence

A large historical literature has pointed to a connection between the extension of the electoral franchise and the timing of agrarian reforms as well as the use of defensive patterns of agrarian organization by landlords to protect against the real or perceived threats of property rights challenges. In a recent book on the topic, Lapp (2004, front flap) argues bluntly that "nearly every extension of suffrage to the rural poor [in Latin America] occurred at the same time as land reform. Politicians did not merely react to peasants' demands; rather, they sought political power by extending the right to vote while redistributing land." One important example were the electoral reforms of 1958 in Chile which effectively expanded the size of the rural electorate and reduced landlords' opportunities for vote manipulation by establishing an effective secret ballot (Baland and Robinson, 2003). Political parties responded by campaigning for the newly freed votes in the countryside, competing to propose new legislative bills which over the next few years lifted bans on rural unionization and led to increasingly more radical and far-reaching agrarian reforms over the 1962-1973 democratic period. Swinnen (2000) argues for a similarly striking connection between the timing of franchise extensions and the timing

of far-reaching and extensive throughout many countries of Europe in the early 20th century.

In some instances the connection between the form of agrarian organization and the defensive protection of property rights becomes patently obvious. In El Salvador in the early eighties thousands of tenants were evicted very shortly after it became apparent that legislation for a land-to-the-tiller agrarian reform would be proposed (Pelupussy, 1997, Prosterman and Riedinger, 1987). de Janvry (1981) provides the classic statement of the ways that land rental and sales markets have failed to reallocate land toward family farmers in Latin America, and how land reform processes have been subverted or stalled through the political activities of landlords. He argues that the anticipation of agrarian reforms led landlords in several countries to turn to new production activities that relied more on hired wage labor and machinery rather than tenants.

In other regions latent conflicts have meant that tenancy never became firmly established. Zamosc (1986) describes the ways that Colombian landlords' used pasture-rent contracts to open up new frontier land in the north-western regions of the country. Under this system peasants would clear forest to open up new land in exchange for being allowed to grow rice, yuka, maize or other food crops. At the end of a few years however peasants were required to sow pastures and return the land to the landlord. The tenant was then typically moved onto a new plot of land in a different location. Tenants were often also required to live in hamlets or on the roadsides between haciendas rather than on the land they farmed. Such practices seemed clearly aimed at limiting tenants' ability to establish competing property claims or squatter rights. Yet even this defensive arrangement came to an abrupt collapse with the debate and passage of national legislation in 1968 granting potential rights to tenants which, according to Zamosc, led landlords to expel tenants "on a massive scale, abolishing the customary patterns of access to land within a couple of years (pp.78-79)."

A central point of our analysis is that latent property rights conflicts may lead to defensive organization and other costly activities that can long delay the emergence of explicit national level political reform, yet nonetheless have important economic consequences. The following excerpts from a letter written in the early 1950s by a landlord in the Cerro de Pasco region of Peru gives a good sense of the political dimensions of the property rights insecurity that many landlords in Latin America perceived they faced:

> "Seldom does a week go by without a boundary controversy ... the 'comunidad' keeps pushing its livestock onto this disputed land, and often gets the

Senators and Deputies of their Departments and Provinces to put pressure on the Government to decide in [their] favour ... These disagreements last for one to ten years, and during this time our boundary riders are constantly fighting to protect our land. ... our boundary riders have been cursed, clubbed and hit with rocks by our neighbors ... There are two weaknesses that make our battles long and hard. One is the Government's lack of firm support to the rightful private land owners who occupy the land disputed. The Government agency gives the 'comunidades' moral support, encouragement and confidence in these affairs, instead of reprimanding them for their unauthorized, unorthodox and illegal procedures. The other weakness is the poor description or method of designating the boundaries of our titles ... [in some cases] we have had to depend upon the 'squatter's right' or physical possession to keep us put. In two early cases, the 'comunidades' took possession of our land and pushed us off ... we have fifteen land disputes pending [in the courts] ... one has been going on since 1914, and it is still a perennial headache (cited in Duncan et al., 1977, pp. 87).".

It is of course difficult to imagine landlords voluntarily leasing out land to any one but the most trusted of tenants under such circumstances.

The more difficult and interesting question is why did such conflicts arise and persist with such long-lasting detrimental economic consequences in places like this in Latin America whereas large scale transfers of land were accomplished via a combination of markets and political redistribution in favor of squatters and small farmers in North America. A central argument in Hernando de Soto's important book the *Mystery of Capital* (2000) addresses this question. He argues that the many squatters that dominated the American landscape from the earliest days of the colony, and for as long as the frontier continued to expand, were able to wrest land rights for themselves in the face of competing claims because they were well organized and became a politically powerful force. Large landlords or public entities that might have held competing legal claims more often than not found it easier and more profitable to simply sell or surrender lands to squatters who were well armed and very often won the support of local politicians and courts. Recognizing squatter's rights served as a mechanism to promote new settlement and to win political support. The development of good land registries and capital markets to facilitate transfers would have also favored this outcome. In terms of our model we might think of the high political power of squatters as factors leading to a high α but relatively

low transaction costs κ leading landlords and states in North America to favor selling or ceding land titles they might have claimed to farming households rather than try to protect property rights in more costly efficiency-distorting ways.

One may also ask why did large areas of Asia and Europe develop such historically high levels of tenancy, and why did those regions later have far reaching land and tenancy reforms to benefit of so many tenants? The model suggests several possibilities, although we need to step somewhat outside of our simple assumptions about timing and rational anticipation. A much longer pattern of dense agricultural settlement in many parts of Western Europe and Asia, much lower concentration of land, and the presence in many regions of strong centralized states interested in maintaining clear cadastral property records in part to facilitate tax collection, would have led to more clearly defined and secure property rights, and therefore the rise of more tenancy over time. Over centuries, many tenants acquired customary occupancy rights. As described by Swinnen (2000), tenancy reforms were enacted in rapid succession in most countries of Western Europe to satisfy the large and new political constituency of tenants as political revolutions and other previously unimaginable political events extended the electoral franchise in many countries of Europe.

How agrarian reform arises as a political issue can also help to shed light on agrarian structures and the relative success of land reforms in East Asia. The land reforms that affected Taiwan, Korea and Japan, each occurred in the context of actual or threatened external invasion which were unanticipated events that undermined dominant landlord classes whose authority had been previously relatively unchallenged. However, as soon as the political basis for these property rights was undermined, the existence of a large population of sitting tenants assured overwhelming political support for far-reaching land reforms and later for continued support for the rural sector.

The fact that land reform arose in an unanticipated manner, and that widespread tenancy had been stable for so long, meant that landlords had not organized production to avoid this and tenants already had *de facto* possession of the land about to be re-distributed. Jeon and Kim (2000) analyze the fascinating case of land market sales in anticipation of agrarian reforms in South Korea. Tenancy under the Japanese colonial administration 1919-45 had been a widespread phenomenon as by one measure over 56 percent of farmer households were tenants and 58 percent of farmland was under tenancy in 1939. Although tenant protests demanding lower rents were not uncommon, the Japanese colonial military presence had strictly enforced landlord's property rights. Landlord political power was however very seriously and abruptly undercut when the

Japanese were forced to abandon the Korean peninsula and Korea came under the US military administration in August 1945. Both the US military administration and the first democratically elected administration in 1948 almost immediately signaled plans to implement land reform legislation. The North Korean threat helped to override remaining political resistance, and far-reaching land reform legislation was passed into law in 1950. Although the reforms had the appearance of being externally imposed, Jeon and Kim are clear to point out that the 1948 land reform should be understood as "an endogenously determined governmental policy consistent with the intuition of the median voter theorem ... [as] tenants represented the largest portion of the population (pp. 257-258)." They argue that the anticipation of land reform had been evident from the moment the Japanese had begun withdrawing years before final reforms were enacted. The eventuality of reform was indeed so certain that 60 percent of landlords – mostly the larger ones – sold their land to tenants via the market at reduced prices before 1950. Remarkably, more than twice as much land was sold by landlords in anticipation of the reform than was transferred directly via the land reform process (p. 255, Table 1). This is strongly consistent with the implication of our model that, under the right conditions, a market for squatters rights will emerge under the specter of expected reforms.

6   Conclusion

The modern theory of agrarian organization has studied how the economic environment determines organizational form under the assumption of exogenous property rights to land. The political economy literature has modeled the endogenous determination of property rights and the distribution of land ownership. In this paper we have argued that the form of agrarian organization – the endogenous stratification of households into economic classes and the extent of tenancy – may also be influenced by the anticipation of property rights challenges. We argued in particular that landowners may have an incentive to limit the extent of tenancy to reduce the potential impact of reforms on their personal properties. We identified conditions that might help determine why in some societies latent conflicts over property rights lead to distorted equilibria with heavily suppressed activity in both the land rental and the land sales market. Loosely, we might associate this type of outcome with the type of ongoing and unresolved property rights conflicts over land that de Soto (2000) and others suggest has been a defining characteristic of much of the informal sector in the developing world, and particularly in regions of Latin America. de Soto contrasts this situation to the historical experience of the United States, Europe

and parts of Asia where squatting and informality were at one point, arguably, just as prevalent and widespread but where political solutions and markets evolved to transfer property rights to individuals in ways that soon reduced conflict, led to strengthened new property rights, and spurred the development of new markets. We have argued that this kind of outcome might be understood partly in terms of the emergence of what we called a market for 'squatters rights,' where in effect the looming threat of reform encouraged the rapid transfer of rights to farm operators who were in a better position to defend those rights in the future.

Hundreds of papers and several good books have been written to explain how asymmetric information and other elements of the economic environment may shape the form of tenancy contracts and equilibrium patterns of agrarian organization. It has not been our purpose to challenge these explanations but rather to have argued that the political factors that shape the nature of visible and latent property rights conflicts over land are often also important determinants of households microeconomic decisions. A simple test of the theories implications using data from Indian states provides suggestive confirmation of the importance of political variables in explaining the variation of tenancy across states and its evolution over time.

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Table 1: Distribution of farmland by land tenure status, 1970 World Census of Agriculture

	North America	Europe	Latin America	Asia	Africa	World
Number of Countries	2	12	15	10	4	46
Number of Farms (millions)	3.1	11.9	8.6	93.3	3.5	120.4
Avg. operational farm size (ha)	161.2	7.6	46.5	2.3	0.5	10.0
Percent of farmland under:						
Pure owner Cultivation	36.6	58.9	80.4	84.0	9.2	61.1
Pure Tenancy	11.9	12.5	6.2	5.9	3.0	9.0
Owner-cum-Tenancy	51.5	28.5	5.6	10.1	29.1	27.2
Communal or other	0.0	0.1	7.8	0.0	58.7	2.7

Source: Table 1.1. in Hayami and Otsuka (1993) *The Economics of Contract Choice*, Oxford.

Notes: Farmland under owner-cum-tenancy includes both owned and leased land. *North America*: Canada, USA; *Europe:* Austria, Belgium, France, West Germany, Italy, Malta, Netherlands, Norway, Poland, Portugal, Sweden, UK; *Latin America*: Costa Rica, Dominican Republic, El Salvador, Guadeloupe, Honduras, Panama, Puerto Rico, St. Lucia, Virgin Islands, Brazil, Colombia, Peru, Surinam, Uruguay, Venezuela; *Asia*: Bahrain, India, Indonesia, Jordan, Korea, Kuwait, Pakistan, Philippines, Saudi Arabia, Singapore. *Africa*: Cameroon, Reunion, Swaziland.

Table 2: Land Gini and area cultivated by tenure status in selected countries

	Year	Land Gini	Pure Tenant	Tenancy Total[a]
ASIA				
Bangladesh	1976	0.42	-	20.9
India	1970	0.62	2.4	8.5
Indonesia	1973	0.56	2.1	23.6
Philippines	1971	0.51	21.4	32.8
Thailand	1978	0.45	6	15.5
Taiwan	1939	-		*56.3*
	1959	-		*14.4*
Korea	1939	-	-	*58.4*
	1955	0.34	-	*0.5*
Japan	1941	0.42	-	*45.8*
EUROPE				
Belgium	1880	-	-	*64.0*
	1990	-	-	*67.0*
Ireland	1870	-	-	*96.0*
	1990	0.62	-	*6.0*
France	1880	-	-	*40.0*
	1990	0.54	-	*57.0*
UNITED STATES				
	1969	-	-	*40.0*
	1997	0.73	-	*49.0*
LATIN AMERICA				
Argentina	1960	0.79	14.6	-
Brazil	1970	0.84	6.1	10.2
Bolivia	1950	0.94	7.5	-
Costa Rica	1973	0.82	1.2	9.0
Chile	1965	0.94	14.2	24.4
Colombia	1960	0.86	5.3	11.5
El Salvador	1961	0.81	7.8	-
Nicaragua	1963	-	2.6	-
Peru	1961	0.91	4.5	13.6
Uruguay	1970	0.82	19.1	46.3
Venezuela	1961	0.91	4.5	2.4

Notes: Non-italics numbers in the Tenancy Total column indicate the fraction of cultivated land under pure tenancy or owner-cum-tenancy (i.e. the data do not distinguish between leased and owned land in the owner-cum-tenancy subcategory). Italicized figures report only the fraction of cultivated land actually under tenancy (i.e. not counting owned land in the owner-cum-tenant subcategory).

Sources: Asian country data except for Taiwan and Korea from Table 1.2 in Hayami and Otsuka (1993); Taiwan: Fei, Ranis & Kuo (1979). Korea: Jeon and Kim (2000), Table A1; Japan: Tuma (1965), Table 23. Europe: Swinnen (2000), various tables. Latin America and 1969 data for United States: Wilkie, J. (ed.) (1996), Tables 200, 201, 206. United States: 1997 Census of Agriculture. Land Ginis for USA, Ireland, and France from Deininger and Olinto (2000), Table 2.

Table 3: Data on Tenancy, Land Distribution, and Agrarian Reforms for Indian States

State Name	Tenancy share of cultivated land under tenancy 1954	1961	1972	1982	1992	% change 54-'92	Land Gini land gini coefficient (including landless) 1961	1992	% chg	Noland % HH owning no land 1954	Clr1 cumul. tenancy reforms (by '92)	Clr cumul. all reforms (by '92)	Urban % popn. urban 1992	Candpseat candidates per seat (mean)
Andhra Pradesh	19.1	9.1	9.1	6.2	9.6	-50	76.1	73.1	-3.0	30.3	1	2	27.2	4.4
Assam	43.5	15.4	19.6	6.3	8.9	-80	62.2	54.9	-7.2	41.6	1	3	11.2	5.7
Bihar	12.4	10.3	14.5	10.3	3.9	-69	69.5	66.9	-2.6	16.6	4	7	13.2	8.4
Gujarat	6.2	5.8	4.0	11.9	3.3	-47	68.2	69.1	0.9	30.5	2	4	34.8	5.2
Jammu and Kashmir	22.2	14.1	8.0	2.4	.	-89	53.1	51.6	-1.5	17.3	1	2	24.9	4.8
Karnataka	16.4	18.2	15.9	6.0	7.4	-55	66.3	68.3	2.0	22.8	2	4	31.1	4.8
Kerala	20.0	15.3	8.4	2.0	2.9	-86	75.5	64.8	-10.7	36.3	4	9	27.1	4.4
Madhya Pradesh	18.6	6.4	7.5	3.6	6.3	-66	63.6	64.5	0.9	29.8	1	3	23.4	6.0
Maharashtra	26.8	8.7	6.1	5.2	5.5	-79	70.6	70.5	-0.1	28.6	1	2	39.0	5.5
Orissa	12.6	10.8	13.4	9.9	9.5	-25	68.0	60.6	-7.4	12.3	3	8	13.5	4.7
Punjab	40.4	35.4	28.1	16.1	18.8	-53	74.7	73.4	-1.3	36.9	1	1	29.7	5.3
Rajasthan	20.9	4.9	5.6	4.3	5.2	-75	65.3	62.1	-3.2	24.9	0	1	23.0	6.2
Tamil Nadu	27.5	16.5	13.2	10.9	10.9	-60	74.4	74.3	-0.1	33.6	6	7	34.3	5.2
Uttar Pradesh	11.4	8.1	13.3	10.2	10.5	-8	61.7	63.0	1.3	9.4	2	5	20.0	8.9
West Bengal	25.4	17.6	18.6	12.3	10.4	-59	66.2	67.9	1.7	20.5	9	15	27.6	4.3
Unweighted Average	21.6	13.1	12.4	7.8	8.1	-60	67.7	65.7	-2.0	26.1	3	5	25.3	5.8

Sources: All Tenancy data from National Sample Survey Organization as reported in Sarvekshana (various years) and Bardhan (1979).

All other variables are from the Besley and Burgess' (2000) panel dataset.

Table 4: Regression Results

	1		2		3		4	
Method	OLS		FE		IV-FE (Clr1)		IV-FE (Clr)	
State Effects	no		yes		yes		yes	
Year Effects	yes		yes		yes		yes	
Instruments	no		no		yes		yes	
Tenancy								
Cumulative Reform	0.116	(0.82)	-1.031 *	(0.08)	-1.423 *	(0.06)	-0.757 *	(0.09)
Land Gini (lagged)	-1.180	(0.35)	1.162	(0.33)	4.393 *	(0.00)	4.107 *	(0.00)
Land Gini squared (lagged)	0.010	(0.30)	-0.009	(0.36)	-0.034 *	(0.00)	-0.032 *	(0.00)
Noland (lagged)	0.006	(0.96)	0.278 *	(0.07)	0.287 *	(0.02)	0.295 *	(0.02)
1972 dummy	0.328	(0.90)	2.943	(0.18)	2.982	(0.11)	2.881	(0.13)
1982 dummy	-3.931	(0.20)	0.578	(0.84)	-0.524	(0.84)	-0.651	(0.80)
1992 dummy	-2.748	(0.37)	1.549	(0.57)	0.306	(0.91)	0.184	(0.95)
overall intercept	43.665	(0.28)	-23.099	(0.54)	-125.053 *	(0.00)	-116.277 *	(0.00)
Cumulative Reform (first-stage)								
Urban					-0.630 *	(0.00)	-1.226 *	(0.00)
Candpseat (lagged)					-0.501 *	(0.01)	-0.634 *	(0.00)
Land Gini (lagged)					0.475	(0.12)	0.710	(0.14)
Land Gini squared (lagged)					-0.004 *	(0.08)	-0.007 *	(0.07)
Noland (lagged)					0.091 *	(0.00)	0.187 *	(0.00)
1972 dummy					1.604 *	(0.00)	2.881 *	(0.00)
1982 dummy					4.520 *	(0.00)	8.042 *	(0.00)
1992 dummy					7.402 *	(0.00)	13.098 *	(0.00)
overall intercept					5.542	(0.59)	16.069	(0.32)
N	60		60		55		55	
R-squared	0.17		0.75		0.81		0.81	
R-squared (first stage)					0.85		0.85	

Notes: p-values in parentheses. An * indicates significant at 10% level (two-tailed test).