Latifundia Economics

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Abstract

This paper proposes a simple general equilibrium theory of agrarian organization to explain the emergence and transformation of latifundia economies and labor-service systems such as prevailed historically until recent times in many parts of Latin America and Eastern Europe, and in part laid behind serfdom. Where land ownership becomes sufficiently concentrated, equilibria may emerge where landlords, behaving as multi-market Cournot oligopolists, suppress tenancy markets to drive up land rentals and corral cheaper labor into their expanding estates, even where technology or labor supervision efficiency considerations favor larger tenancies. Labor-service obligations, similar to those observed in historical practice emerge as a logical element of landlords' optimal contract. Price discrimination by landlords helps reduce allocative inefficiency but leads to lower equilibrium wages and peasant welfare. The analysis demonstrates how the canonical neo-classical model can be extended to yield quite general results concerning how asset inequality interacts with factor endowments and technology to reshape the equilibrium pattern of production organization and its transformation over time in the face of population growth, differential technical progress on landlord and peasant farms, property rights reforms, and other changes in the physical and economic environment.

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1 Introduction

Although the regions of North and Latin America were both established as European colonies with similar abundance of natural resources and high land to labor ratios, they soon embarked on divergent development paths. Economists otherwise fond of emphasizing the role of factor endowments and population growth in shaping the path of economic growth and structural transformation of Europe[1] have tended to need to fall back on explanations emphasizing the different nature and quality of institutions and cultures of the regions to explain this divergence. Yet such explanations are not entirely convincing, and remain incomplete until they can explain why these institutions and cultures change, or fail to change, over time. They also fail to account for the substantial divergence of outcomes within Latin America even amongst countries that share common colonial heritage, culture and religion.

A more compelling explanation, emphasized in recent scholarship on comparative economic performance by Engerman and Sokoloff (2000) and others, attributes much of the divergence in economic outcomes to Latin America's much higher initial inequality. They emphasize for example that whereas the Spanish crown granted vast tracts of land and substantial control over indigenous labor to a small number of original colonizers, settlers to the North American colonies arrived to no such landed privileges (the slave-owning US South meriting a separate discussion). According to Engerman and Sokoloff's account the highly skewed distribution of resources in Latin America led to slower growth by contributing to "the evolution of political, legal, and economic institutions that were less favorable toward full participation in the commercial economy by a broad spectrum of the population." Over time this in turn shaped the further evolution of land policy itself. Whereas the political process in the United States led to the recognition of property rights to hundreds of thousands of squatters and small settlers (de Soto, 2000) and the opening of vast new frontier regions to successive waves of new immigrant settlers, land-owning elites in Latin America captured the political process to limit and curtail the ability of independent small farmers to establish or maintain lasting property rights in newly opened frontier

[1] North and Thomas (1973).

regions (Bulmer-Thomas, 1994).

While the large haciendas of New Spain initially relied heavily on compulsory Indian labor drafts, most such practices were abolished or regulated by the crown as early as 1632, and landlords sought to find other ways to secure labor for production under conditions of labor scarcity. This gave rise to a range of institutional adaptations such as labor-service tenancy that shaped the pattern of agrarian organization for decades and centuries to come. As late as the mid twentieth century, agrarian production organization in many countries of Latin America was still marked by the predominance of large landlord estates, or Latifundia. Labor on the estates was provided either by attached workers and labor-service tenants living within the estates, or by temporary workers drawn from surrounding communities of very small peasant farms, or Minifundia that often coexisted nearby.[2] In North America the same crops were produced instead by a large number of independent family farms.

Engerman and Sokoloff argue that the more egalitarian pattern of land ownership and production organization in North America led to faster growth by creating better incentives for work and innovation, as well as by engendering more competition and broader credit markets, and more effective governance structures for local taxation and investments in public education.

The story sounds persuasive, but a number of problems emerge as one tries to formalize such arguments. Most fundamental is the question: Why should initial land inequality have led to persistently inefficient allocations and slower growth? Why couldn't the issues of efficiency have been separated from the problems of distribution? If the pattern of farm production organization in the United States was more efficient and generated faster skill accumulation because of the better work incentives facing independent farm operators, then why did not Latin America's landlords choose to sell their lands, or fill up their estates with tenancies, to cash in on the higher land values that such a more efficient pattern of production organization would have engendered?

Historically Latin America has in fact cultivated a much *smaller* fraction of its agricultural land under tenancy than counterpart regions in Europe, Asia, or the United States and Canada.[3] Why should such an apparently inefficient pattern of

[2]For detailed descriptions of agrarian production organization in Latin America and their evolution over time see for example Bauer (1975), Bulmer-Thomas (1994), Chevalier (1963), Binswanger and Deinenger (1995) and Pearse (1975).

[3]Hayami and Otsuka (1993), Binswanger and Deinenger (1995), and Conning and Robinson

production organization persist for centuries? Several explanations have been advanced: economies of scale in production, landlord myopia, landlords that are more concerned with status rents than profits, credit market imperfections, differential skills and management ability. Each of these are addressed in more detail below, where I argue that most of these commonly advanced answers fail to adequately or completely explain the facts.

One argument that might plausibly account for the absence of more active tenancy and land sale markets in many parts of Latin America is that landlords chose to organize production and manipulate politics as they did because it helped them to extract monopoly rents from land, and by extension, monopsony rents over labor. Henry George expressed this monopoly-cum-monopsony succinctly, if somewhat crudely, more than a century ago in *Progress and Poverty*, 1879. The essence of the idea is that landlords might be able to take advantage of their market power over the land market to facilitate their exercise of market power over labor by acting to limit peasant access to land in the tenancy or land sale market. Naturally, their ability to do so will be limited by the extent of competition with other landlords (which in turn may depend on asset concentration), the extent to which there are efficiency advantages to organizing production on small farms, and by other constraints likely to vary from one environment to the next.

The purpose of this paper is to explore a canonical neo-classical model to explore precisely how factor endowments, the initial distribution of property rights, the nature of production technologies, the distribution of skills in the population, the extent of competition between landlords, and other elements in the economic environment might affect equilibrium patterns of agrarian production organization via landlords' exercise of market power. As will be argued, the model also helps clarify the historical circumstances under which landlord elites might choose to either block or enable peasant access to frontier land or redefine property rights over land in other ways via political or extra-legal means. In a companion paper I explore how the model helps shed light on Evsy Domar's famous hypothesis on the causes of Slavery or Serfdom (Domar, 1958) .

To understand the argument, consider the simplest case of a single landlord surrounded by a fringe of landless or small landowning peasant households. When initial

(2001) provide comparative statistics and discussion on this topic.

land inequality is high, the landlord naturally owns a large fraction of this economy's land endowment. As the standard partial-equilibrium analysis of non-price discriminating monopoly tells us, this landlord would attempt to drive up the rental price of land by withholding land from the lease market. In a general equilibrium setting there is another effect, however. By restricting peasants' access to land, landlords also lower the marginal product of labor on peasant farms, thereby shifting out the peasant sectors' supply of labor to landlord estates at any given wage.

Landlords' optimal markup pricing decisions are shaped by the interaction of these land monopoly and labor monopsony market power effects – henceforth labeled 'monopsoly' effects for short. This leads to equilibria where landlords increase the size of their production estates scale above what they would be in an efficient competitive equilibrium and they use overly land-intensive production techniques. Peasant producers in turn are lead by distorted equilibrium factor prices to employ overly labor-intensive techniques on inefficiently small farms. The resulting economy therefore displays the coexistence of Latifundia and Minifundia and the characteristic inverse farm size - productivity relationship that has been noted empirically in several contexts (Berry and Cline, 1979; Bardhan and Udry, 1999; Cornia, 1985; Kevane, 1996). These arguments are readily extended to the case of competing landlords in a multi-market Cournot oligopoly (or 'oligopsoly') game, with the expected result. If the distribution of initial property rights becomes more egalitarian, and/or where competition amongst landlords is more intense, the usual neoclassical efficient competitive market equilibrium re-emerges.

The model yields interesting predictions of how equilibrium agrarian structures are transformed over time in response to population growth, differential rates of technical progress on landlord and peasant farms, property rights reforms, and other changes. These predictions make sense of important historical transformations in agrarian production organization that appear puzzling within standard neoclassical economic analyses. For example, I show that under certain conditions skill accumulation, technical advancements, or increases in the profitability of production that increase labor demand on landlord farms relative to the peasant sector may actually lead to lower equilibrium wages by increasing landlords' ability to exercise market power[4]. I re-

[4]The model offers the beginning of a formal resolution of sorts to the so called 'Brenner-Debate.' This debate, which "may justifiably lay claim to being one of the most important historical debates" of the last half century (Aston and Philpin eds., 1987) was set off by Robert Brenner's (1977) spirited

view historical evidence to suggest that such an outcome may have occurred during the wheat export boom that helped consolidate Chilean landlord estates in the late nineteenth century (Bauer, 1975) or in the consolidation of coffee export estates in Central America.

This leads us to the question of politics. If initial land concentration is sufficiently high, and/or the productivity on landlord estates is raised relative to peasant farms the monopsony rents that landlords stand to capture by affecting peasant labor supply may become sufficiently large that landlords decide not only to withhold land from the lease market but to encroach on peasant land. Where peasant property rights over land are secure, this process would be mediated by transactions on the land market as landlords bought or leased-in peasant land. But where property rights enforcement is an endogenous outcome, landlords may prefer instead to limit peasant access to land by using political influence or extra-legal coercion. Thus although the focus of the model is primarily on equilibrium allocations under secure property rights, this paper derives results that point to predictions about the likelihood and timing of land grabs, enclosures, squatting, land reform and violence.[5]

As is well understood, in a constant returns production environment, more than one market distortion must be present for inefficient equilibrium outcomes to emerge. In our model the market-power distortion arises because of landlords inability to perfectly price-discriminate.[6] Interestingly, the contracts that price discriminating landlords would employ closely resemble the type of labor-service tenancy arrangements that were widely prevalent well into the twentieth century in Chile, Bolivia,

attack of neo-classical and demographic theories of history and the transition from feudalism and capitalism, such as advanced by Postan (1972), North and Thomas (1973) and others. Brenner's contention was that the evidence showed that many economies did not at all respond in the ways predicted by neo-classical models due primarily to the uneven distribution of power and coercion in different societies. For example, while the Black Death and resulting population decline led to rising real wages for peasants and the decline of serfdom in England and other parts of Western Europe as predicted by the neo-classical view, it led to a hardening of serfdom in many parts of Eastern Europe. The present model shows that some of Brenner's arguments might have been right (ironically) within a neo-classical framework.

[5]A related paper by Conning and Robinson (2001) presents a model with political-economic equilibria that determine both the extent of property rights security and the pattern of agrarian production organization. Their model however uses a less general linear production technology and makes fewer predictions about production organization within landlord estates.

[6]See Kevane (1996) for an extended discussion of this issue. Banerjee, Gertler and Ghatak (2000) show why to be effective tenancy market reforms must simultaneously regulate more than one dimension of the contract.

Peru and several other countries of Central and South America. These arrangements, in which tenants went by names such as *inquilinos*, *yanaconas*, *peones encasillados*, or *huasipungueros* depending on the region, required tenants to provide labor service to the landlords's estate as a condition for obtaining access to a small plot of land. Similar types of arrangements have been widely prevalent at different points in time in may other parts of the world, and were at the heart of the patron-serf relationship in Europe. For example Morner (1970) describes similar arrangements under serfdom in Europe, and in more recent times in tenancy systems such as the *Statartorpare* (Sweden), *Husemenne* (Norway), *Instleuete* and *Heurerlinge* (North East Germany), the *Tamalia* system (Egypt) and *colonos camaradas* (Brazil following abolition).[7]

The model shows that efforts to regulate such contracts, for example by requiring that landlords pay a uniform daily wage, can lead landlords inefficiently to further reduce the area under tenancy and/or to expel tenants. Such a pattern is consistent with the historical experience of several countries (de Janvry, 1981). Interestingly, the general equilibrium impact of such regulations may be to raise peasant household wages and welfare even though it may result in a more inefficient pattern of production organization.

The rest of the paper is organized as follows. After a brief literature review, five scenarios are analyzed to compare the impact of initial land inequality on equilibrium resource allocation and household welfare: (1) a Chayanovian economy characterized by complete factor market autarky, (2) the efficient competitive factor markets equilibrium, (3) an economy under the assumption that landlords can exercise full market power via perfect collusion and price discrimination, (4) Monopoly-cum-monopsony (or 'monopsoly') equilibria where a single landlord exercises market power but is limited to charging a uniform wage and rental rate to the market, and (5) an extension to a multi-market oligopoly Cournot game between competing landlords. Several properties of these equilibria are illustrated using a Cobb-Douglas parameterization. The remaining sections of the paper explore how the equilibrium pattern of agrarian organization responds to changes in the underlying economic environment, and in particular to changes in the initial assignment of property rights, population growth,

[7]Sadoulet (1992) analyzed a model of labor service tenancies in Chile based on moral hazard and limited liability. I argue in this paper that labor service contracts could have arisen in conditions similar to those analyzed by Sadoulet even in the absence of moral hazard or credit market imperfections.

and technological change and skill accumulation. I also discuss why land sales markets fail and discuss agents' incentives to challenge or protect property rights via political or extra-legal means. A final section concludes.

1.1 Literature Review

The idea that landlords attempt to affect peasants' willingness to supply cheap labor by limiting their access to land and other productive opportunities has been widely discussed by economists and historians in many contexts. Binswanger, Deininger and Feder (1995) catalog dozens of historical episodes in Africa, Latin America, Europe and Asia where such processes appear to have been at work. Even in the United States, following the abolition of slavery, almost all southern states soon enacted 'Black codes' featuring strict anti-vagrancy laws, hunting regulations, and explicit limits on freed slaves' access to land and credit. There is little doubt that the primary purpose of these laws was to restrict black laborers' ability to establish new independent production opportunities and hence to maintain labor supply to plantation fields (Hahn, 1982; Moore, 1965). Over time the system gave way to extensive share-cropping and labor-service tenancy arrangements sustained and enforced by paternalism and violence (Alston and Ferrie, 1998).

Although these issues are historically important, few formal analyses of the topic exist. Koo (1982), responding to Griffin (1974) posed the question of whether and how monopoly power in the land market might facilitate monopsony power over the labor market, but his was a partial-equilibrium analysis and therefore remained speculative and inconclusive in many of its results. Anderson Schaffner (1995) analyzed a model that showed how landlords could increase their market power by encouraging a culture of servility and limited time horizons amongst their attached labor force. More recent work by Robinson and Baland (2000) and Conning and Robinson (2000), examine how high levels of land inequality and inefficient production organization might persist as political-economic equilibria, but these papers focus on primarily politics and in much simpler production environments and therefore do not capture the essential microeconomic foundations. The contribution of the present paper is to explain why inefficient production organization patterns might arise and persist as equilibrium outcomes in a much more general production environment, without appealing to information asymmetries, credit market imperfections, politics

or special preferences.

In a formal sense this paper is most closely related to a literature on general equilibrium trade models with factor market monopsony distortions, and most closely to the work Feenstra (1981), Markusen and Robson (1980) and McCulloch and Yellen (1980).[8] The present analysis extends these earlier results in several dimensions. Most significantly, these earlier analyzes focused exclusively on what I label "size monopsony" distortions arising from assuming that exogenous barriers to entry give rise to a single large firm (or concentrated number of firms) which becomes able to exercise monopsony power over its factor input markets. In contrast, I focus on an economy with many competing firms with each firm producing under diseconomies of scale to emphasize that there is no technological reason or exogenous barrier to entry causing firmst to become very large. Factors of production in my model are owned by the same households that organize production. If land ownership becomes sufficiently concentrated in the hands of just a few firms they may begin to exercise monopoly/oligopoly power by witholding land from the lease market and hence become larger. It is as they become larger due to the exercise of monopoly power over land that these firms then become able to also exercise monoposony power in the sense of this earlier literature. Hence my focus is on the complementary interaction between these distinct monopoly and monoposony effects. The canonical neo-classical model, and the monoposony models of this earlier literature emerge as special limiting cases of my model. I argue that for many realistic economic parameters the 'monopsoly' distortions I identify are far more distortionary than the monoposony effects alone.

This paper is also related to Eswaran and Kotwal's seminal 1986 general equilibrium model of agrarian production organization. In that paper the authors posited a trade-off between a labor market imperfection which favored small farm producers, and fixed production costs and a credit market imperfection which favored larger farms. The initial distribution of land property rights matters in their competitive markets model because at high levels of inequality, larger farms are favored on the credit market and small farm production is squeezed out. In contrast to them, the trade-off in our model is between what can be interpreted as a labor market imperfec-

[8] A concise survey of this topic is found in chapter 24 of Bhagwati, Panagariya and Srinivasan's (1998).

tion (e.g. non-traded labor supervision abilities or farming skills) favoring small and medium farm production, and the exercise of market power which naturally favors larger farms.

A recent paper by Carter and Zimmerman (2000) extends Eswaran and Kotwal's model to a dynamic setting and argues that 'time and markets' tend to ameliorate and repair the allocational inefficiencies in the static version of that economy. For example, peasant households that cannot borrow to lease land in a static setting would have strong incentives to save resources over time to accomplish their goals. In our model, time and credit markets do not repair a distorted economy because the land sale market continues to fail over time for the same reason it fails in a single period: because landlords do not wish to undercut their own market power by leasing out more efficient quanties of land. A longer time horizon might even further distort transactions on the land market by facilitating collusion amongst landlords. It might also, as analyzed below, lead to a skewed pattern of skill accumulation and technological change that further reinforces rather than undermines monopsoly power effects. Efficiency will be restored if landlords are able to price-discriminate by issuing but the resulting economy immizerizes the peasant sector further.

2 The Model

2.1 Preliminaries

The economy has $\overline{T}$ units of cultivable land and $\overline{L}$ households with one unit of labor each. The economy-wide land to labor ratio is therefore $\overline{t} = \overline{T}/\overline{L}$. There are $\lambda\overline{L}$ landlord and $(1-\lambda)\overline{L}$ peasant households. Without loss of generality assume $\overline{L}$ is large and $\lambda\overline{L}$ is always an integer number of households.

The $\lambda\overline{L}$ landlord households own $\theta\overline{T}$ units of land, peasant households own the remaining $(1-\theta)\overline{T}$ units. The average peasant household therefore owns $\frac{(1-\theta)\overline{t}}{(1-\lambda)}$ units and, for the moment, all peasant households have the same initial land endowment. For this stylized economy and these assumptions the land Gini coefficient is simply given by $[\theta - \lambda]$.

A single tradable good such as corn is produced and consumed in the economy at a price fixed at unity by trade with the world market. Households maximize utility from consumption subject to household income from farm profits and factor sales. To

keep the model simple, we assume households inelastically supply their entire labor endowment to own farm production and/or to the labor market.

All peasant households have access to the same production technology represented by a standard concave production function $\widehat{F}(T, L, S)$ which is assumed to be linearly homogenous in its three arguments: land T,labor L, and a third factor which we label S.This last factor is assumed to be a non-traded factor that captures farming skill or labor supervision ability.For the time being we assume that landlords' production technology $\widehat{G}(T, L, S)$ is exactly identical to the peasant technology, so $\widehat{G}(T, L, S) = \widehat{F}(T, L, S)$.

For the time being we also assume that all households have the same endowment, $\overline{S} = 1$. Under this assumption it becomes convenient to work with the restricted production function $F(T, L) = \widehat{F}(T, L, 1)$. This function is obviously homogenous of degree $k \leq 1$ in its two arguments. We assume it satisfies the Inada end-point conditions $F(T, 0) = F(0, L) = 0$, $F_T(0, L) = F_L(T, 0)$ for all T and L.So long as S is a productive but non-traded input k will be strictly less than one and $F(T, L)$ will be decreasing returns to scale in land and labor. Each households' efficient operational farm size is then determined by the household's ownership of $\overline{S}$,and all households that own S will produce.

2.2 Autarky and Competitive Allocations

As a benchmark, consider first how equilibrium allocations depend on the initial land inequality parameter θ under the Chayanovian assumption of complete factor market autarky. As every household owns exactly one unit labor total household income for landlord and peasant farms are respectively:

$$\begin{aligned} V_R^a(\overline{t}, \theta) &= F\left(\overline{t}\frac{\theta}{\lambda}, 1\right) \\ V_P^a(\overline{t}, \theta) &= F\left(\overline{t}\frac{(1-\theta)}{(1-\lambda)}, 1\right) \end{aligned}$$

Economy-wide output depends on the initial distribution of land and will be at a maximum under full land equality, or when $\theta = \lambda$.Only then can land to labor ratios, and hence the ratio of shadow factor prices, equalize across farms. Landlord income $V_R^a(\overline{t}, \theta)$ is increasing, and peasant income $V_P^a(\overline{t}, \theta)$ decreasing, with θ. Economy-wide

deadweight-loss is rising with θ for all $\theta > \lambda$ because increasing land inequality widens the gap between shadow factor prices and hence allocative inefficiency.

Consider now the case of competitive equilibria where all farms face the same equilibrium market factor prices r and w. Since by assumption all farms use the same decreasing returns to scale production technology (since $\overline{S} > 0$ is the same across households) all farms must choose the same optimal production technique $(T^*(r,w), L^*(r,w))$ and operate at the same operational farm size. Every farm earns the same profit $\Pi(r,w;\overline{S})$, which is really just an economic rent on the non-traded factor $\overline{S}$.

Since economy-wide competitive demand for land is $\overline{L}T^*(w,r)$ and total supply is $\overline{T}$, market clearing implies $T^*(r,w) = \overline{t}$. Similarly, labor market equilibrium requires $\overline{L}L^*(r,w) = \overline{L}$, or $L^*(w,r) = 1$. Competitive equilibrium factor prices are therefore simply $r = F_T(\overline{t},1)$ and $w = F_L(\overline{t},1)$.

Since every farm produces $F(\overline{t},1)$,economy-wide output is $\overline{L}F(\overline{t},1)$. Household income can be viewed as the sum of farm profits plus the market value of their factor endowment, or equivalently, as the value of farm production plus net factor sales priced at market prices. Simple algebra shows landlord and peasant household income to be simple linear functions of θ as summarized in expression (1) and in figure 1:

$$\begin{aligned} V_R^c(\overline{t},\theta) &= F(\overline{t},1) + F_T(\overline{t},1)\overline{t}\left(\frac{\theta-\lambda}{\lambda}\right) \\ V_P^c(\overline{t},\theta) &= F(\overline{t},1) + F_T(\overline{t},1)\overline{t}\left(\frac{\lambda-\theta}{1-\lambda}\right) \end{aligned} \tag{1}$$

Peasant net supply of land or labor to the marketplace are given by the difference between their factor endowment and what is needed for own farm production. An individual peasant household's net supply of land and labor are then given by.

$$T_p^c = \overline{t}\frac{(1-\theta)}{(1-\lambda)} - T^*(r,w) \tag{2}$$

$$L_p^c = 1 - L^*(r,w) \tag{3}$$

Under the maintained assumptions, $T_p^c < 0$ for all $\theta > \lambda$, so peasant households have a negative net supply of land (i.e. a positive net demand). This is depicted by the negatively sloped straight line of figure 2 which shows that total peasant sector net

demand for land rises linearly with θ.[9] Under our maintained assumption of identical households, efficient net labor demand is zero for all θ.

2.3 'Monopsoly' Equilibria

Assume now that landlords are able to recognize and take advantage of any market power that they might have over the land lease or labor hire market, and to collude as a cartel. I later establish how the results are modified if one allows non-cooperative strategic 'oligopsoly' behavior amongst landlords, or perfect price discrimination.

To find the cartel's optimum, we first derive peasant net market factor supply as a function of offered factor prices. Peasant households lease in or lease out land and labor until the marginal revenue product of each factor equals its factor price. Given that peasant production functions are homogenous of degree $k < 1$, the two first order conditions $F_T(T_p, L_p) = r$ and $F_L(T_p, L_p) = w$ can be solved to yield unique expressions for optimal factor use $L_p(w, r)$ and $T_p(w, r)$ as a function of the market wage and rental rate. The landlord cartel's decision problem is to choose land-use T_r and labor-use L_r on each representative landlord farm to maximize the value of farm production income plus net factor market sales. Equivalently, the cartel maximizes the value of farm profits plus the value of the landlord's factor endowment:

$$\max_{T_r\ ,L_r} \left[G(T_r, L_r) - F_T(T_p, L_p)T_r - F_L(T_p, L_p)L_r\right] \tag{4}$$

$$+ \left[F_T(T_p, L_p)\frac{\theta}{\lambda}\overline{t} + F_L(T_p, L_p)\right] \tag{5}$$

This way of writing the objective function underscores a crucial difference between the present analysis and prior literature on monopsony factor market distortions in general equilibrium. In the earlier literature, an exogenously specified barrier to entry in one sector allows one very large firm to establish *de facto* monopsony power over both factor markets. The large firm exercised market power to maximize firm profits (i.e. the first part of (4) above) but was not concerned about how its production decisions affect the value of its shareholders' factor endowments (i.e. the second part of (4) because these models assume widely dispersed factor ownership and constant returns to scale in production.

[9] This would obviously change if household labor endowment varied across the population, if households had different holdings of S, or had access to different production technologies.

In our model there are no strong barriers to entry limiting production to just one farm. In fact, the assumption of decreasing returns in production due to the non-tradability of S stacks the deck heavily against the operation of a single large farm. In equilibrium there are always $\overline{L}$ farm operators. Thus, if we restricted landlords' objective to maximizing the first line of (4) above, the 'size monopsony' rents to be captured are quite small under most realistic scenarios. Our focus is on the market power effects that emerge when sufficiently concentrated ownership of land allows landlords to capture monopoly land rents by witholding land from the lease market. Monopoly and monopsony effects turn out to be tightly interelated – as landlords expand the scale of their estates to capture monopoly rents, size monopsony effects become increasingly important and even dominant. I label this scenario 'monopsoly' to underscore the interaction of monopoly and monopsony effects and to distinguish it apart from the pure 'size monopsony' scenarios of the earlier literature.

Equilibrium requires that total demand for factors on landlord and peasant equal the size of the factor endowment. This implies that

$$T_p = \frac{\overline{t}}{(1-\lambda)} - \frac{\lambda}{(1-\lambda)} T_r \tag{6}$$

$$L_p = \frac{1}{(1-\lambda)} - \frac{\lambda}{(1-\lambda)} L_r \tag{7}$$

and therefore that $\frac{dT_p}{dT_r} = \frac{dL_p}{dT_r} = -\frac{\lambda}{(1-\lambda)}$.With this, first-order necessary conditions for a maximum to (4) can be written:

$$G_T = F_T \left[1 - \frac{\lambda}{(1-\lambda)} \frac{F_{TT}}{F_T} \left(\frac{\theta}{\lambda} \overline{t} - T_r \right) - \frac{\lambda}{(1-\lambda)} \frac{F_{LT}}{F_T} (1 - L_r) \right] \tag{8}$$

$$G_T = F_T \left[1 - \frac{\lambda}{(1-\lambda)} \frac{F_{TT}}{F_T} \left(\frac{\theta}{\lambda} \overline{t} - T_r \right) - \frac{\lambda}{(1-\lambda)} \frac{F_{LT}}{F_T} (1 - L_r) \right] \tag{9}$$

The first expression can be interpreted as a modified version of the land monopolist's pricing rule for hiring out land until marginal revenue equals marginal cost. The direct marginal cost of leasing out an additional unit is measured in terms of foregone output on the landlord estate G_T. Marginal revenue is given by the rental rate $r = F_T$ at which that unit is hired out plus the usual negative effect on rental earnings of having to lower the rental rate on inframarginal leases. Finally, there is an additional impact on the cost of hiring wage labor that results from the fact that

leasing more land raises the marginal product of labor on peasant farms. Analagous interpretations reveal the second first-order condition (9) to be a modified version of the labor monoponist's pricing rule.

Given our homogeneity assumptions, equations (8)-(9) can be solved for a unique set of landlord T_r, L_r. The system is however highly non-linear and closed form solutions for T_r and L_r will not, in general, be available even for quite standard production functions. Substantial insight into the properties and structure of this model economy can nonetheless be deduced.

Dividing (9) by (8) and rearranging yields:

$$\frac{G_L}{G_T} = \frac{F_L}{F_T}\,\Gamma \tag{10}$$

$$\text{where } \Gamma = \frac{\left[1-\frac{\lambda}{(1-\lambda)}\frac{F_{TL}}{F_L}(T_r-\frac{\theta}{\lambda}\overline{t})-\frac{\lambda}{(1-\lambda)}\frac{F_{LL}}{F_L}(L_r-1)\right]}{\left[1-\frac{\lambda}{(1-\lambda)}\frac{F_{TT}}{F_T}(T_r-\frac{\theta}{\lambda}\overline{t})-\frac{\lambda}{(1-\lambda)}\frac{F_{LT}}{F_T}(L_r-1)\right]} \tag{11}$$

Expression $\frac{G_L}{G_T}$ and $\frac{F_L}{F_T}$ are respectively the shadow wage-rental factor price ratios on landlord and peasant farms. Under the assumption that landlord and peasant farms have access to the same production technology $\widehat{G} = \widehat{F}$ (but not necessarily the same endowment of S) efficiency in production would require $\frac{G_L}{G_T} = \frac{F_L}{F_T}$.The contract curve would be a straight line with slope equal to the economy-wide land to labor ratio $\overline{t}$. From (10) it is clear that $\frac{G_L}{G_T} \gtreqless \frac{F_L}{F_T}$ as $\Gamma \gtreqless 1$.

Proposition 1 *Assume landlord and peasant farms have access to the same general production technology $\widehat{G} = \widehat{F}$ (but not necessarily the same endowment of S). Then as long as $\theta > \lambda$, $\Gamma > 1$ and hence $\frac{G_L}{G_T} > \frac{F_L}{F_T}$.*

Proof. See appendix. ■

When land ownership becomes sufficiently concentrated, landlords start to become able to exercise monopoly power by withholding land from the lease market relative to the competitive outcome. This raises the shadow wage-rental price ratio on landlord farms above peasant farms, so $\frac{G_L}{G_T} > \frac{F_L}{F_T}$. Simple manipulation of condition (10) shows this is equivalent to stating that $T_p^m/L_p^m < \frac{(1-\theta)}{(1-\lambda)}\overline{t}$, where $T_p^m = \overline{t}\frac{(1-\theta)}{(1-\lambda)} - T_p$ and $L_p^m = 1 - L_p$, refer to peasant net supply (demand) for land and labor respectively. This condition is automatically met so long as the peasant sector hires in land and

sells labor ($T^m < 0 < L^m$) but also leaves room for landlord estates to expand to such an extent that landlords might begin to encroach on peasant lands and the peasant sector supplies both labor *and* land to landlords ($0 < T^m < L^m$) at distorted market prices.

This last 'reverse-tenancy' scenario is not as improbable as it might seem: if land is sufficiently concentrated in landlords', and if the efficiency 'cost of being large' (i.e. if the degree of homogeneity k is sufficiently close to one because factor S is not too important in production), then landlords may find it optimal to withhold all their land from the market and turn to buying or leasing any remaining land to squeeze out peasant tenancy entirely in an all-out effort to depress the wages at which it hires labor.

To illustrate results I turn to graphical simulations of the economy using a standard Cobb-Douglas production technology $\widehat{F}(T, L, S) = T^{\alpha}L^{\beta}S^{1-\alpha-\beta}$. Under the maintained assumption that $\overline{S} = 1$ for all households, the restricted production function is $F(T, L) = G(T, L) = T^{\alpha}L^{\beta}$, where $\alpha + \beta < 1$. For the base case simulation below I have assumed an economy with $(1-\lambda)\overline{L} = 99$ peasant households and $\lambda\overline{L} = 1$ landlord. The economy-wide land to labor ratio is normalized to $\overline{t} = 1$, and each household has $\overline{S} = 1$. Under these assumptions production efficiency requires 100 farms of equal operational size, each employing $\overline{t}$ units of land and one unit of labor.

The Cobb-Douglas production function used to generate the base case for these simulations set $\alpha = 0.49$ and $\beta = 0.49$. This choice makes the production homogenous of degree $k = 0.98$, or relatively close to constant returns to scale. This last assumption implies that the cost of expanding wage labor production on larger than first-best efficient scale farms will not be too large. Smaller values of $k = \alpha + \beta$ would raise the cost of exercising market power by raising the costs of production on larger scale wage-labor farms relative to employing more efficient subtenants or family-operated farms. As explained below, much lower degrees of production homogeneity (i.e. lower values of α and β in the Cobb-Douglas case) are however also compatible with strong market power effects if we relax the somewhat unrealistic assumption that landlords have exactly the same skill, technology and access to markets as peasants farmers.

2.4 Analysis

2.4.1 Land inequality and equilibrium agrarian structure

Figure 1 shows equilibrium net factor supplies at different initial levels of land inequality for the assumed Cobb-Douglas parameterization. Under competition or the efficient price discriminating monopolist case (discussed below) net supply of land to each peasant household ($-T^c$) can be seen to rise linearly with θ (recall $T^c < 0$),and the efficient level of net peasant labor supply remains at zero at every level of θ as every household's labor demand exactly equals its unitary labor endowment. At low levels of land inequality monopsoly equilibrium factor supplies closely approximate the efficient competitive allocations as landlords don't own enough land to exercise very much market power. But at higher levels of inequality landlords become able to exercise increasing amounts of market power by withholding greater and greater amounts of land from the market. Monopoly power over land translates into monopsony power over labor as higher equilibrium land rents lead peasant households to use less land, lowering the marginal product of labor on peasant farms, which in turn shifts out peasant net labor supply to the market, lowering equilibrium wages. The supply to the landlord sector L^m increases with θ.

An interesting regime shift occurs around the vicinity of $\theta \approx 0.7$. Up to that point, landlords are becoming more and more aggressive at exercising market power and withholding land as θ increases. At around $\theta \approx 0.7$, landlords' supply of land has actually fallen to zero, and at higher levels of θ landlords optimally encroach on peasant farms by *leasing in* peasant land. The explanation is that at relatively low levels of land inequality monopsoly landlords earn the bulk of their income as land monopoly rents and relatively less from the monopsony rents that result from hiring peasant labor below it's marginal product. But at higher levels of inequality, monopsony rents becomes increasingly central to the landlords' strategy. Since at about $\theta \approx 0.7$, landlords are withholding all land from the market, all rents at that point are from monopsony. At even higher levels of inequality landlords are actually prepared to pay high rents to buy or lease up peasant lands to push more cheap labor onto the landlord estates.

Figure 4 shows what happens to land-labor ratios on landlord and peasant farms. As landlord estates expand with higher θ, so does landlord output. Over the range

of θ leading up to $\theta \approx 0.7$, land use on the hacienda grows faster than labor use so the land to labor ratio rises on landlord farms and falls on peasant farms. Land-labor ratios can't continue to rise forever with θ on larger and larger estates, since in the limit a landlord estate the size of the entire economy must employ the economywide land-labor ratio. So somewhat before $\theta \approx 7$, we start to see the land-to labor ratio on landlord farms begin to taper off. Even though landlords are at this point hiring in peasant land (and the land-labor ratio on peasant farms is falling quickly), landlords as monopsony employers are hiring in labor at a faster rate than their land leases.

At higher θ landlords can exercise more market and lower peasant output and welfare and economywide output relative to the efficient competitive outcome. Figure 1 graphs equilibrium peasant sector income $V_P^i(\theta)$ and total income $V_P^i(\theta) + V_R^i(\theta)$ for different levels of initial land inequality θ, under competitive, price-discrimination,[10] and monopsoly market structures ($i = c, a, m$).

Whether these effects will be pronounced or not, will depend on the nature of the production technology and parameters describing the economic environment. The economic logic of these arguments is quite general, however. For example, the argument that higher θ allows landlords to exercise more monopoly power and therefore that less land will be offered on the lease market relative to competitive allocations requires only that peasant demand for land be downward sloping ($F_{TT} < 0$). The argument that landlord monopoly power on the land market opens the way for the exercise of monopsony power on the labor requires only that $F_{LT} > 0$ and that peasant labor supply have positive slope ($F_{LL} < 0$).

2.4.2 Technology and skill accumulation

> "[T]he owners of plantations have no interest in seeing knowledge of new techniques or new seeds conveyed to the peasants ... [nor will they] support proposals for land settlement, and are often instead to be found engaged in turning the peasants off their lands." (Arthur W. Lewis, Economic Development with Unlimited Supplies of Labour, 1954: 149)

Historical accounts of peasants being supposedly immizerized or disposed by the introduction of new export crop technologies or a commodity export boom are easy to

[10] The price discrimination case is discussed in a later section.

come by in history books, as are historical claims that landlords have often sought to block peasant access to new technologies or skill accumulation (Bhadhuri, 1973). To most trained economists however these accounts often appear puzzling, if not totally incoherent. How, one might ask, could peasant labor be immizerized by a commodity export boom when the most likely consequence would seem to be an increase demand for labor which would almost surely translate into higher, not lower, equilibrium wages and income?. And why would a rational landlord object to peasants acquiring new skills or technologies when this would only seem to increase the marginal productivity of land, and therefore land rents?

Yet many of these seemingly counter-intuitive historical accounts do make sense within the neo-classical framework if one allows for monopsoly power effects. Immizerizing growth results are an application of the theory of the second best: when equilibrium allocations are already distorted, adding technology or skill accumulation to landlord farms may serve to further strengthen market power and hence deepen equilibrium allocation distortions. Conversely, improving peasant technology or skills may raise peasant sector and total output but simultaneously lower landlord reuturns if they weaken landlords' ability to exercise market power.

To see this, consider the effect of increasing a landlord's ownership of non-traded factor S while keeping the peasant population's fixed at $S = 1$. In the Cobb-Douglas formulation the production function can be written $AF(T, L) = T^{\alpha} L^{\beta} S^{1-\alpha-\beta}$ where $A = S^{1-\alpha-\beta}$. An increase in the landlords' A while keeping peasant production technology unchanged might be associated with a relative increase in skill accumulation, in total factor productivity, or in the price of landlord crops relative to peasant crops.

In a competitive market, a rise in the profitability of landlord production would lead landlord farms to be operate on a larger efficient scale. The peasant sector benefits because the equilibrium wage rate would rise as landlord demand for labor increased. Concretely, if peasants and landlord produce with production functions $F(T, L)$ and $AF(T, L)$ respectively,then landlords' land and labor usage will be $\tau = (\frac{1}{A})^{\frac{1}{k-1}}$ times as large as that on peasant farms and equilibrium wage and rental rates rise to reflect greater demand for both factors on landlord farms.. Peasant factor use falls to $L^u = \frac{1}{(\tau\lambda+(1-\lambda))}$ and $T^u = \frac{1}{(\tau\lambda+(1-\lambda))}\overline{t}$.

In the presence of monopsoly power effects, a similar improvement in land and labor productivity on landlord farms may instead result in immiserizing growth for the

peasant sector. The reason is that an increase in landlords' S lowers the opportunity cost of operating a large farm which had acted as the main constraint on the exercise of market power. By increasing labor demand it also increases the scope for earning monopsony rents over wage labor.

This possibility is illustrated in figure 7. The lower and upper solid lines reproduce, respectively the net supply of land from the landlord to the peasant sector and the total net peasant labor supply to the landlord's estate from the earlier monopsoly analysis. The dashed lines in the figure show how each of these net factor supply curves change as a consequence of a five-fold increase in a landlord's skill level from $S = 1$ to $S = 5$.

Given that this represents a relatively small change in the economy's total stock of S – a four percent rise from 100 to 104 – one would expect only a small effect but positive effect on the equilibrium competitive wage rate. Figures 6 and 7 show however that under monopsoly power, the result is instead a marked decrease in the net supply of landlord land to peasant farms, an increase in equilibrium supply of peasant labor to landlord estates, and a *fall* in equilibrium wages.

As this discussion suggests, the earlier assumption of approximately constant returns to scale in $F(T, L)$ was not essential to the emergence of strong market power effects. Anything that helps lower landlords' cost of operating on a larger scale, including credit market imperfections or agricultural subsidies biased to favor larger farms will facilitate the exercise of market power and multiply its economic effects. .

2.5 The effects of population growth

The model thus far has identified conditions of high initial land inequality as important in the emergence and persistence of a latifundia-minifundia complex. This section analyzes how equilibrium agrarian structure might be affected by other important economic factors, such as population growth or the incorporation of new frontier lands, which would alter the economy-wide land to labor ratio. Economic historians have hypothesized that the Latin American latifundia, and a host of colonial era institutions and regulations that compelled local populations to provide labor service to large landlord estates, were institutional responses to the conditions of relative labor scarcity that the Spanish colonizers encountered in the new world (Pearse, 1975; de Janvry, 1981). Florescano (1987) has noted for example that the "two periods of

extensive land distribution [in Central Mexico], 1545-7 and 1585-95, were linked to the great epidemics of 1545-7 and 1576-80 which decimated the Indian population (p.256)."

It is important to note at the outset that an increase in the labor force can come about in several different ways, and how it comes about can make a difference. The labor force can expand through growth in the average size of each farming household, and/or because of the arrival of new households. To analyze these cases, let us change the model and notation slightly so that there are now $\overline{L}-1$ peasant households and just one landlord. Every household has H laborers. The landlord owns fraction θ of the economy's land $\overline{T}$ and the peasant households evenly divide the $(1-\theta)\overline{T}$ remaining land units. The total labor force in the economy is now $\overline{L}H$, the land to labor endowment is $\bar{t}_H = \overline{T}/\overline{L}H$, and land per household is $\bar{t} = \overline{T}/\overline{L}$.

Consider first the effect of an increase in the number of peasant households on efficient production organization, while keeping household size H constant. On the assumption that each new household brings non-traded farming skill $S = 1$, efficiency in production requires the new farm households to be producers. The economy-wide land to household ratio $\bar{t}$ has fallen. Per household demand for land falls because the equilibrium operational farm size (also $\bar{t}$) falls and with it the equilibrium competitive wage-rental ratio. The landlords' supply of land to the peasant sector, $-T^c = \theta\overline{T} - \bar{t}$, increases slightly. Total output increases but output per household and per-capita falls. Factor supplies in the discriminating market power case are identical to this efficient competitive case. Landlords however now benefit from the falling wage-rental ratio because peasant reservation payoffs fall as the average peasant household owns less land when there are more households.

The effects of population growth are quite different if we instead increase household size H while keeping the number of households constant. The efficient competitive allocation now entails the same $\overline{L}$ household farms each producing $F(\bar{t}, H)$. The land-to-household ratio (and hence farm size) will remain unchanged with an increase in H. The equilibrium wage rental rate falls but the landlord's supply of $-T^c = \theta\overline{T} - \bar{t}$ units of land to the peasant sector remains unchanged. Since a rise in H increases the labor force without increasing the economy-wide stock of S, output per capita falls more rapidly compared to the scenario of the last paragraph. The

more important the role of S in production, the more marked this difference will be.[11]

Consider next the effect of these labor growth scenarios on equilibrium allocations under monopsoly. Increasing household size H while keeping $\overline{L}$ fixed does not alter the number of farms;. nor does it affect the landlord's net supply of land to the peasant sector. Doubling household size across all farms thus leaves land use patterns unchanged while doubling labor supply to the hacienda at each level of land inequality θ. This occurs because peasant households inelastically supply to the market all labor that they cannot profitably use on their own farms.

The impact of population growth is more interesting when we instead increase $\overline{L}$ while keeping H fixed. Figure 5 shows the effect on equilibrium T^m and L^m of doubling the number of peasant households in the economy from 100 to 200, under the same Cobb-Douglas parameterization discussed above. Landlords withhold less land from the market relative to the efficient level (as indicated by T^m versus T^c in the figure), the larger is the number of peasant producers in the economy. The reason is that as each new peasant household brings non-traded factor S into production , the landlord's opportunity cost of organizing production inefficiently (withholding land) rises when there are more peasant producers. At very high levels of initial land inequality θ however (levels above 0.8 in the figure) landlords find it just as profitable to encroach on peasant land anyway, and most of the new population still end up working on the landlords' hacienda rather than as independent farm producers.

These results cast new light on several historical discussions. The model confirms the observation that landlords' incentive to withhold land from the market (and/or to encroach upon peasant land) appears to be more pronounced in conditions of labor scarcity, but clarifies that it is not so much labor scarcity per-se that favors the latifundia, as much as the paucity of potentially independent peasant producers.

2.6 Property rights conflicts and politics

> "So one of the hacendados' principal strategies for acquiring workers was, precisely, to seize the lands of the Indian communities." (Enrique Florescano, The Hacienda in New Spain, 1987: 267)

[11] A closely related scenario is the case of population growth due to the arrival of new households that do not possess farming skills S. As these households would not carry out farm production they hire out all labor and any land that they may own.

Thus far we have treated the initial distribution of property rights over land as given and secure. In practice property rights are however frequently contested, and agents in the economy have incentives to invest both in private and collective efforts to shape property rights in their favor. For example landlords have at times used violence and legal manipulations to encroach upon peasant lands via land grabs, evictions. Peasants also at times contest landlords' property rights by squatting or by mobilizing in support of land reform. In stark contrast to the United States, landlords in Latin America have shaped the evolution of land policies in their favor, denying rural lower classes access to the vast available areas of frontier lands (Huber and Safford, 1995; Bulmer-Thomas, 1994).

Without explicitly modeling property rights conflicts, the model suggests where property rights conflicts are most likely. To see this notice that a redistribution of property rights is equivalent to a change in θ. Under competitive markets no agent would be willing to pay more than the fixed market rental rate to obtain or protect another unit of land. For given factor endowments, the marginal product of land remains constant at $F_T(\overline{t}, 1)$ and is independent of θ. When landlords can exercise market power however the private marginal return to land is increasing in θ for both landlords and peasants. To see this differentiate expressions (1) and (**??**) to obtain:

$$\frac{\partial V_R^d}{\partial \theta} = \frac{\overline{t}}{\lambda} F_T \left(\frac{(1-\theta)}{(1-\lambda)} \overline{t}, 1 \right) > \frac{\partial V_R^c}{\partial \theta} = \frac{\overline{t}}{\lambda} F_T(\overline{t}, 1) > 0$$

The expressions above state that the marginal impact of an increase in θ on landlord income is always higher when the landlord has discriminating market power compared to the competitive allocation.[12] Furthermore, this difference is increasing in θ since

$$\frac{\partial V_R^{2d}}{\partial \theta^2} = -\frac{\overline{t}}{\lambda(1-\lambda)} F_{TT} \left(\frac{(1-\theta)}{(1-\lambda)} \overline{t}, 1 \right) > 0 = \frac{\partial V_R^{2c}}{\partial \theta^2}$$

The *marginal* incentive to challenge property rights thus rises with the initial level of land inequality in the market power case. This suggests that latent or actual property rights conflicts are much more likely to arise in economies where higher initial inequality allows landlords to exercise monopsony power. Specifically one would expect to see costly ex-ante investments to encroach upon the property rights

[12] Similarly unambiguous results cannot be derived for the general monopsoly case because the inequality $\frac{\partial V_R^m}{\partial \theta} > \frac{\partial V_R^c}{\partial \theta}$ may be reversed depending on θ. It can nonetheless be shown that the desired result holds for low enough or high enough θ.

of others, or to protect one's own property rights against the challenges of others when land inequality is high and landlords can exercise market power. More specific assumptions about how property rights conflicts arise and are resolved are needed to make more precise predictions however.[13]

The land rental market and the land sales market are essentially one and the same in this static setting. The same reasoning extends naturally to the multi-period setting: landlords who cannot price discriminate withhold land from the market because to sell or lease out any more land would only undercut their market power. The model explains why an inefficiently low volume of transactions might persist through time without having to appeal to credit market imperfections or transaction costs.

2.6.1 Extensions to the basic model

Price discrimination and labor service obligation If the landlord cartel could act like a price-discriminating monopolist, the cartel would want to maximize total output via efficient subtenancies but then find ways to extract all the gains to trade via take-it-or-leave-it contracts separately offered to each individual peasant household.

Formally the landlord's contract design problem can be seen as choosing each peasant household's factor supplies T^d and L^d and setting a lump-sum rental payment level R so as to maximize income from production on landlord farms plus lump-sum rentals, subject only to the constraint that each peasant household earn at least as much as their autarchy payoff, and therefore be willing to participate:

$$\max_{T^d,L^d,R} F\left(\tfrac{\theta}{\lambda}\overline{t} + \tfrac{(1-\lambda)}{\lambda}T^d, 1 + \tfrac{(1-\lambda)}{\lambda}L^d\right) + \tfrac{(1-\lambda)}{\lambda}R$$
$$\text{s.t.} \quad F\left(\tfrac{(1-\theta)}{(1-\lambda)}\overline{t} - T^d, 1 - L^d\right) - R \geq F\left(\tfrac{(1-\theta)}{(1-\lambda)}\overline{t}, 1\right)$$

Without loss of generality, each landlord can be viewed as contracting with $(1-\lambda)/\lambda$ peasants. The peasant participation constraint obviously must bind, as otherwise landlords could increase their earnings further by raising R. This binding constraint yields an expression for R. Substituting this into the objective function, and differentiating with respect to T^d and L^d leads to first-order conditions that, not surprisingly,

[13] See for example Hotte ([29]) and references therein for a discussion of models that specify property rights encroachment and protection functions. Conning and Robinson (2000) analyze a linear production technology model where landlords organize production inefficiently in an effort to lower tenants' incentives to challenge property rights through the political system.

exactly match the first-order conditions for the efficient competitive case (1) analyzed above. Production is organized efficiently, but payoffs are now sharply favor the landlord:

$$V_R^d(\theta) = F(\overline{t},1) + \frac{(1-\lambda)}{\lambda}\left[F(\overline{t},1) - F\left(\frac{(1-\theta)}{(1-\lambda)}\overline{t},1\right)\right] \quad (12)$$

$$V_p^d(\theta) = F\left(\frac{(1-\theta)}{(1-\lambda)}\overline{t},1\right) \quad (13)$$

Each landlord gets the value of production on his own farm plus rental income from subtenancies. Rental income from each of the $(1-\lambda)/\lambda$ tenants is set to $R = F(\overline{t},1) - F\left((1-\theta)\overline{t}/(1-\lambda),1\right)$, or the value of peasant production less that tenant's autarky reservation payoff. As explained below, if in an efficient equilibrium landlords have a positive net demand for labor, labor will be supplied under a labor service obligation clauses built into the contracts.

It is interesting to note that optimal price discrimination contracts will be characterized by non-linear tariff pricing and labor-service obligations, features that were defining characteristics of the contractual relationships under serfdom and labor-service tenancy arrangments in Europe and Russia, and labor-service systems such as *inquilinaje* and *yanaconaje* that persisted in Latin America well into the twentieth century.

To see that non-linear tariff pricing is involved, suppose for a moment that the $(1-\lambda)\overline{L}$ peasant households were now divided into two sub-classes: small landowning households with $\frac{2(1-\theta)}{(1-\lambda)}\overline{t} < \overline{t}$ units of land each, and an equal number of landless households. Landlords will optimally require landless peasant households to pay $R_0 = F(\overline{t},1) - F(0,1)$ for access to $\overline{t}$ units of land whereas landowning peasants can be asked to pay no more than $R_1 = F(\overline{t},1) - F\left(2(1-\theta)\overline{t}/(1-\lambda),1\right)$ for access to $\overline{t} - 2(1-\theta)\overline{t}/(1-\lambda) = -T^d$ units of land. The rental payment rate must therefore be tied to the peasant household's factor endowment in a non-linear way: landless peasants are charged higher rentals per unit land because they have less attractive fall-back options.

To see why the contracts must also involve control over labor in the form of labor-service obligations, suppose again that there are landowning and landless peasants as in the previous paragraph, but that landlords had a much larger initial stock of non-traded factor S. Compared to before, efficiency requires that landlords farm at

larger operational scales and have a positive net demand for labor in equilibrium. Landlords' must now offer interlinked take-it-or-leave-it contracts that require the peasant both to work L_i^d units of labor on the landlord desmene and to make payment R_i in exchange for access to T_i^d units of land, where $i = 0, 1$ refers to landless and small landowning peasant households respectively. If contracts were not bundled, tenants would demand a wage for working on the landlords' desmene proportional to the opportunity cost of their time on fields they have leased.

Historical evidence supporting these interpretations is discussed below. In practice of course perfect price discrimination and fully efficient labor-service contracts seem difficult to implement and sustain. Landlords might not be able to tailor the terms of their contracts to peasant household's outside opportunities because of legal impediments, peasant resistance, or because asymmetric information makes it difficult to condition contracts upon peasant's outside opportunities and actions.[14] Intermediate agrarian structures, somewhere in between the monopsoly and the pure price discrimination cases seem more likely to emerge.

Historical discussion Vladimir Lenin, who dedicated a chapter of *The Development of Capitalism in Russia* to an analysis of labor-service tenancy, seemed to summarize evidence to support the analysis I've presented when observed that "[t]he data from various sources are at one in testifying to the fact that the payment of labour where it is hired on a labour-service and bonded basis is always lower than under capitalist "free" hire." He also very clearly perceived landlords' efforts to price discriminate by tailoring contracts to peasants' outside opportunities when he wrote that "rent in kind is developed to the greatest degree among the poorest groups of peasants ... well-to-do peasants do what they can to pay rent in money...to escape bonded hire (Lenin, 1956; Chapter 3, paragraph 3)."

In *The Rise of the Western World,* North and Thomas (1973) argued that labor-service obligations on the European manor arose primarily where "there was no organized market for goods and services. (p.20) a position that has been challenged both empirically and theoretically by Brenner (1977) and others. Labor-service tenancy clearly did persist in monetized economies of Eastern Europe well into the 19th cen-

[14] de Janvry (1981) attributes most of the decline of Chile's labor-service tenants, or *inquilinos* to the passage of new laws requiring the payment of uniform minimum agricultural cash wages.

tury and in Latin America and Africa well into the the twentieth century (Morner, 1970; de Janvry, 1981). In fairness, North and Thomas seemed aware of these issues as they qualified their argument by noting that except for "where the lords could effectively collude rather than compete for labor, as in Eastern Europe, could they thwart the changing status (and income) of their former vassals... To the extent that lords avoided competition for labor, they could prevent a rise in real wages, but collusion over an area large enough to be effective would require centralized political coercion. (North and Thomas, *The Rise of the Western World,* 1973: 24)."

Sadoulet (1992), building on other contributions to the literature on interlinked contracts (e.g. Braverman and Stiglitz, 1982), argues that labor-service obligations arise where limited liability limits the size of fixed rent contracts that landlords can offer to motivate peasant labor effort. The present analysis is congruent with her interpretation, but suggests that labor-service obligations would arise even in the absence of credit or labor market imperfections.

3 Conclusion and application

In a detailed historical account, Arnold Bauer (1971, 1975) chronicles the rise and consolidation of Chile's large landlord estates and the associated system of labor service tenancies known as *inquilinaje,* during the second half of the nineteenth century. His analysis helps put to rest the common myth of inefficient landlords more preoccupied with status than by profit, by demonstrating that estate production in fact responded very flexibly to the new opportunities created by new wheat export markets and falling transport costs. During this period agriculture and labor demand boomed, as the area under wheat cultivation more than tripled between 1850 and 1870.

In neighboring Argentina where landownership was relatively less concentrated and labor more scarce, a similar agricultural boom led to rising wages, increased mechanization and more open immigration policies, as conventional theory would have predicted. Yet, according to Bauer, in Chile the outcome was different as "the information that is available suggests that real wages stayed constant and may have decreased slightly (p.1079)" over the period. Rather than raise wages, landlords satisfied their demand for labor by "tightening of the screws on the service tenants

(p. 1074)" and by restructuring their estates so as to bring in more labor service tenants[15] but reducing average tenants' plot sizes while increasing labor service obligations. Bauer reports that in some regions tenants' labor service obligations doubled or tripled.

Bauer's account of this period appears puzzling to standard economic theory, yet the observed pattern is readily reconciled to the model in this paper. In particular, I have argued that under conditions of sufficient land concentration, an increase in labor demand on landlord farms can lead to an increase in landlords' ability to exercise market power and to declining or stagnant equilibrium wages.

Several other stylized features of what has at times been dubbed the 'backward' agrarian economy (Basu, 1997) emerge as equilibrium features of this simple agrarian economy with endogenous levels of market power. Where the ability to price discriminate is limited, landlords become willing to carry out production on an inefficiently large scale and an inverse farm size-productivity relationship emerges as yield per hectare on smaller, more labor intensive farms exceeds that measured on larger landlord farms. Although landlords' ability to price discriminate helped to restore efficiency, it do so at the expense of peasant welfare, and the contracts that they would employ resembled the sort of labor service-tenancy contract that have historically found to be widely prevalent in many parts of the world.

The conditions that most likely led to the emergence and persistence of inefficient production organization included high initial land inequality, the ability of landlords to collude, a production technology that was approximately constant returns to scale in land and labor inputs. This last assumption was associated with a production technology where non-traded farming skills or labor supervision abilities that might have strongly favored small farm production did not play a big role. More generally, anything in the production environment that gives an advantage to being large can strengthen the exercise of market power. This helps to explain the historical observation that many of Latin America's large latifundia become consolidated during periods of export growth and technological change.

While economic historians have attributed the rise of the latifundia in Latin Amer-

[15] Bauer (1975) calculates that approximately 35,000 inquilinos and permanent workers and 125,000 day laborers worked on estates in 1865. The next comparable data from the 1930 agricultural census shows inquilinos and permanent workers nearly doubling to 67,000 while the number of day laborers stood at 133,000. These figures count only inquilino heads of households.

ica to conditions of labor scarcity, this paper has argued that the effect of population growth on agrarian organization depends in important ways on the nature of the production technology, and on whether or not new arrivals into the labor force possess non-traded skills or other factors of production.

While most of the paper has focused on scenarios where property rights over land were secure and involuntary labor service could not be compelled, the model predicts that agent's incentive to resort to extra-legal mechanisms to encroach upon the property rights of others (or to defend against others' encroachment) will be most pronounced in precisely the same situations where the potential for capturing monopsoly rents is highest. The principle at work is quite general: landlords who withhold land from the market raise the price of land access to levels well above the social marginal product of land. Agents are therefore much more likely to spend resources to encroach upon the property of others, and/or to defend their own property compared to a competitive factor market where no agent would ever be willing to pay more than the social marginal product of land (the equilibrium market price) for access to an additional unit of land.

A longer time horizon and a land sales market does not undo the observed inefficiencies in the economy for precisely the same reason that the land rental market operates at less than the efficient level in the one period case: a higher volume of land sales would only dilute landlords' market power. Since the problem is not due to the absence of a credit market, so called 'market-assisted' land reforms – where the government or some other intermediary helps finance peasant land purchases – will not help improve efficiency unless the government can compel landlords to sell land at truly competitive market prices rather than at manipulated market prices.

3.1 Appendix 1: Landlords as multi-market oligopolists

Thus far we've assumed a perfectly collusive landlord cartel, but the model can be readily generalized to non-cooperative oligopoly. To fix ideas, consider the case of Cournot competition. Since each landlord exercises strategic market power on both the land and the labor market, we model this as a case of multi-market Cournot oligopoly (or 'oligopsoly') between an integer number $N = \lambda \overline{L}$ of landlords, adapting the model to the seminal analysis of Bulow, Geanakoplos and Klemperer (1985).

As before, each landlord owns $\frac{\theta}{\lambda}\overline{t}$ units of land and there are $(1-\lambda)\overline{L}$ peasant

households. Let t_i^m, l_i^m now denote the net land supply and net labor supply from each peasant household to a specific landlord i, where $i = 1...N$. Then $T^m = \sum_{i=1}^N t_i^m$ and $L^m = \sum_{i=1}^N l_i^m$ respectively denote peasant household net supply of land and labor to the *entire* landlord sector. Inverse peasant net supply functions for land and labor can now be written as $r(T^m, L^m) = r(t_1^m...t_N^m, l_1^m...l_N^m)$ and $w(T^m, L^m) = w(t_1^m...t_N^m, l_1^m...l_N^m)$ where

$$r(t_1^m...t_N^m, l_1^m...l_N^m) = F_T\left(\frac{(1-\theta)}{(1-\lambda)}\overline{t} - \sum_{i=1}^N t_i^m, 1 - \sum_{i=1}^N l_i^m\right) \tag{14}$$

and a similar expression is used for $w(T_1^m...T_N^m, L_1^m...L_N^m)$. Landlord j's decision problem is to choose L_j^m, T_j^m so as to maximize profits plus factor income, taking as given other landlords' choices T_{-j}^m, L_{-j}^m, where $T_{-j}^m = (T_1^m...T_{j-1}^m, T_{j+1}^m...T_N^m)$ and $L_{-j}^m = (L_1^m...L_{j-1}^m, L_{j+1}^m...L_N^m)$. We denote landlord j's income by $\Pi_j^m(t_1^m...t_N^m, l_1^m...l_N^m) =$

$$\begin{aligned}\max_{L_j^m, T_{j1}^m} G\left(\frac{\theta}{\lambda}\overline{t} + (1-\lambda)\overline{L}t_j^m, 1 + (1-\lambda)\overline{L}l_j^m\right) \\ -r(t_1^m...t_N^m, l_1^m...l_N^m)(1-\lambda)\overline{L}t_j^m - w(t_1^m...t_N^m, l_1^m...l_N^m)(1-\lambda)\overline{L}l_j^m\end{aligned} \tag{15}$$

When there is more than one landlord ($\lambda\overline{L} \geq 2$) there will be a strategic dimension to landlords' production decisions that was not previously present. Differentiation of (15) with respect to l_j^m, l_j^m yields a set of first-order conditions that are analogous to (8)-(9) and that can be solved to obtain a pair of reaction functions $\widehat{l}_j^m(t_{-j}^m, l_{-j}^m)$ and $\widehat{t}_j^m(t_{-j}^m, l_{-j}^m)$ for each landlord. As all landlords are assumed identical, a symmetric Cournot-Nash equilibrium in pure strategies can be found where each landlord $j = 1...N$ chooses $(l_j^m, t_j^m) = (l^m, t^m)$ such that $l^m = \widehat{l}_j^m(t^m...t^m, l^m...l^m)$ and $t^m = \widehat{t}_j^m(t^m...t^m, l^m...l^m)$ for all j.

In the symmetric Cournot-Nash equilibrium we have $T^m = \lambda\overline{L}t^m$ and $L^m = \lambda\overline{L}l^m$, so the individual oligopsolist's first-order conditions can be written:

$$\frac{\partial G(\cdot,\cdot)}{\partial T^m} = r(T^m, L^m) + \frac{1}{\lambda\overline{L}}T^m\frac{\partial r(T^m, L^m)}{\partial T^m} + \frac{1}{\lambda\overline{L}}L^m\frac{\partial w(T^m, L^m)}{\partial T^m} \tag{16}$$

$$\frac{\partial G(\cdot,\cdot)}{\partial L^m} = w(T^m, L^m) + \frac{1}{\lambda\overline{L}}L^m\frac{\partial w(T^m, L^m)}{\partial L^m} + \frac{1}{\lambda\overline{L}}T^m\frac{\partial r(T^m, L^m)}{\partial L^m} \tag{17}$$

When $\lambda\overline{L} = 1$ the conditions collapse exactly to the previously derived conditions (8)-(9) for a single monopsolist, or a monopsoly cartel. When there are two or

more oligopolists, each oligopolist now faces a more elastic set of peasant (net) factor demands and hence produces less of an impact on wages or rentals from restricting land supply or labor demand. As the number of landlords $\lambda\overline{L}$ rises, the two last terms on the right-hand side of each equation vanish and the first-order conditions approaches those of the efficient competitive solution.

It is evident that the perfect monopsoly and perfect competition equilibria bracket the possible outcomes of the oligopoly case.

3.2 Appendix2: Proof of Proposition 1

The following Lemma will be useful:

Remark 2 ***Lemma 3*** *By Euler's Theorem,* $\frac{T_p}{L_p} = \frac{F_{TL}F_L - F_{LL}F_T}{F_{LT}F_T - F_{TT}F_L}$.

Proof. As $F_T(T, L)$ is homogenous of degree $k-1$,by Euler's Theorem,
$(k-1)F_T = F_{TT}T_p + F_{TL}L_p$
$(k-1)F_L = F_{LT}T_p + F_{LL}L_p$
Multiply the first expression by F_T and the second by F_L
$(k-1)F_TF_L = F_{TT}F_LT_p + F_{TL}F_LL_p$
$(k-1)F_LF_T = F_{LT}F_TT_p + F_{LL}F_TL_p$
Since the two left hand sides are the same
$F_{TT}F_L\frac{T_p}{L_p} + F_{TL}F_L = F_{LT}F_T\frac{T_p}{L_p} + F_{LL}F_T$
rearranging delivers the desired result, $\frac{T_p}{L_p} = \frac{F_{TL}F_L - F_{LL}F_T}{F_{LT}F_T - F_{TT}F_L}$.

Proposition 4 *Assume landlord and peasant farms have access to the same general production technology* $\widehat{G} = \widehat{F}$ *(but not necessarily the same endowment of* S*). Then as long as* $\theta > \lambda$, $\Gamma > 1$ *and hence* $\frac{G_L}{G_T} > \frac{F_L}{F_T}$.

Proof. $\Gamma \gtreqless 1$ *as*

$$\frac{F_{TT}}{F_T}(T_r - \frac{\theta}{\lambda}\overline{t}) + \frac{F_{LT}}{F_T}(L_r - 1) \gtreqless \frac{F_{TL}}{F_L}(T_r - \frac{\theta}{\lambda}\overline{t}) + \frac{F_{LL}}{F_L}(L_r - 1) \tag{18}$$

■

■

Collecting terms and rearranging yields

$$\frac{(\frac{\theta}{\lambda}\overline{t} - T_r)}{(1 - L_r)} \gtreqless \frac{F_{LL}F_T - F_{LT}F_L}{F_{TT}F_L - F_{TL}F_T} \tag{19}$$

$$\frac{(\theta\overline{t} - \lambda T_r)}{(\lambda - \lambda L_r)} \gtreqless \frac{F_{LT}F_L - F_{LL}F_T}{F_{TL}F_T - F_{TT}F_L} = \frac{T_p}{L_p} \tag{20}$$

where the last equality follows from the above remark. Since in equilibrium total peasant demand for each factor must equal available supply, $(1-\lambda)T_p = \overline{t} - \lambda T_r$ and $(1-\lambda)L_p = 1 - \lambda L_r$ it follows that $\frac{T_p}{L_p} = \frac{\lambda T_r - \overline{t}}{\lambda L_r - 1} = \frac{\overline{t} - \lambda T_r}{1 - \lambda L_r}$.Combining this with (19) yields

$$\frac{(\theta\overline{t} - \lambda T_r)}{(\lambda - \lambda L_r)} \gtreqless \frac{\overline{t} - \lambda T_r}{1 - \lambda L_r} \tag{21}$$

If $\theta = 1 > \lambda$ then $>$ holds . Conversely, if $\theta = \lambda = 0$...To be completed...
1.0

References

[1] Alston, L.J. and J.P. Ferrie (1998) *Southern Paternalism and the American Welfare State: Economics, Politics, and Institutions in the South 1865-1965*. Cambridge University Press: New York.

[2] Anderson-Schaffner, J. A. (1995). Attached Farm Labor, Limited Horizons and Servility. *Journal of Development Economics* 47(2): 241-70.

[3] Aston TH and Philpin C.H.E (1987). *The Brenner debate : agrarian class structure and economic development in pre-industrial Europe*, Cambridge University Press: Cambridge ; New York

[4] Banerjee, A., M. Ghatak, and P. Gertler. (2001). Empowerment and Efficiency: Tenancy Reform in West Bengal, *Journal of Political Economy*, forthcoming.

[5] Bardhan, P. (ed.) (1989). *The economic theory of agrarian institutions*. Oxford, Oxford University Press.

[6] Basu, K. (1997): *Analytic Development Economics: The Less Developed Economy Revisited*. Cambridge, MA: MIT Press.

[7] Bauer, A. J. (1975). *Chilean Rural Society from the Spanish conquest to 1930*, Cambridge University Press.

[8] Bauer, A. J. (1971). Chilean Rural Labor in the Nineteenth Century. *American Historical Review* 76(4): 1059-83.

[9] Berry, R. A. and W. R. Cline (1979). *Agrarian Structure and Productivity in Developing Countries*. Geneva, International Labor Organization.

[10] Bhagwati J.N., Panagariya A, Srinivasan T.N. (1998). *Lectures on international Trade,* second edition, MIT Press: Cambridge, Mass.

[11] Binswanger, H. , K. Deininger, and G. Feder (1995). Power, Distortions, Revolt and Reform in Agricultural Land Relations in *Handbook of Development Economics*,Volume III. edited by J. Behrman and T. N. Srinivasan. Amsterdam, North Holland.

[12] Bishop, R.L. (1966) Monopoly under General Equilibrium: A comment, *Quarterly Journal of Economics,* 80(4),652-659.

[13] Boserup, E. (1965). *The Conditions of Agricultural Growth: The Economics of Agrarian Change under Population Pressure.*

[14] Braverman, A. and J. E. Stiglitz (1982). Sharecropping and the Interlinking of Agrarian Markets. *American Economic Review* 72(4): 695-715.

[15] Bulmer-Thomas, V. (1994). *The Economic History of Latin America since Independence*. Cambridge, Cambridge University Press.

[16] Bulow, J., J. Geanakoplos, P. Klemperer (1985). Multiproduct Oligopoly: Strategic Substitutes and Complements. *Journal of Political Economy* 93 (3): 488-511.

[17] Carter, M. R. and Z. F. J (2000). The dynamic cost and persistence of asset inequality in an agrarian economy. *Journal Of Development Economics* 63(2): 265-302.

[18] Chevalier, F. (1963). *Land and society in colonial Mexico; the great hacienda. Berkeley*, University of California Press.

[19] Conning, J. and J.A. Robinson (2002) Land Reform and the Political Organization of Agriculture, C.E.P.R. Discussion paper 3204, Centre for Economic Policy Research.

[20] Cornia, G. A. (1985). "Farm Size, Land Yields and the Agricultural Production Function: An Analysis for Fifteen Developing Countries." *World Development* 13(4): 513-34.

[21] de Janvry, A. (1981): *The Agrarian Question and Reformism in Latin America*. Baltimore: Johns Hopkins University Press.

[22] de Soto, H. (2000). *The Mystery of Capital: Why Capitalism Succeeds in the West and fails almost everywhere else*, New York: Basic Books.

[23] Domar, Evsy (1970) The Causes of Slavery or Serfdom: A Hypothesis, *Economic History Review* 30:1 (March), pp. 18-32.

[24] Eswaran, M. and A. Kotwal (1986). Access to Capital and Agrarian Production Organization. *Economic Journal* 96: 482-498.

[25] Feenstra, R. C. 1980. Monopsony Distortions in an Open Economy: A Theoretical Analysis. *Journal of International Economics* 10(2): 213-235

[26] Florescano, E. (1987). The Hacienda in New Spain. in *Colonial Spanish America*. L. Bethell ed. Cambridge; New York, Cambridge University Press: xi, 455.

[27] George, Henry (1879), *Progress and Poverty*.

[28] Hahn, S. (1982). Hunting, Fishing and Foraging: Common Rights and Class Relations in the Postbellum South. *Radical History Review* 26: 37-64.

[29] Hotte, L. (2000). Conflicts over Property Rights and Natural Resource Exploitation at the Frontier. working paper, Department of Economics, FUNDP. Namur, Belgium.

[30] Huber, E. and F. Safford, Eds. (1995). *Agrarian Structure and Political Power: Landlord and Peasant in the Making of Latin America*. Pittsburgh and London, University of Pittsburgh Press.

[31] Kevane, M. (1996). Agrarian Structure and Agricultural Practice: Typology and Application to Western Sudan. *American Journal of Agricultural Economics* 78(1): 236-45.

[32] Koo, A. Y. C. (1982). Land Market Distortion and Tenure Reform, Iowa State University Press.

[33] Lenin, Vladimir. I. (1956). *The development of capitalism in Russia; the process of the formation of a home market for large-scale industry*. Moscow, Foreign Languages Pub. House.

[34] Lewis, W. Arthur (1954) Economic Development with Unlimited Supplies of Labour, *The Manchester School*.

[35] Markusen, J. R., Robson, A. J. 1980. Simple General Equilibrium and Trade with a Monopsonized Sector. *Canadian Journal of Economics* 13(4): 668-682

[36] Mookherjee, D. (1997). Informational Rents and Property Rights in Land. in *Property Rights, Incentives and Welfare*. J. Roemer (ed.), Macmillan Press.

[37] Morner, Magnus (1970) "A Comparative Study of Tenant Labor i nParts of Europe, Africa and Latin America 1700-1900: A Premilinary report of a resarch project in Social History," *Latin American Research Review*, 5(2), 3-15.

[38] McCulloch, R., Yellen, J. L. 1980. Factor Market Monopsony and the Allocation of Resources. *Journal of International Economics* 10(2): 237-247

[39] North, D. and R. Thomas (1973). *The Rise of the Western World: A New Economic History*. Cambridge, Cambridge University Press.

[40] Nugent, J. and J. A. Robinson (1998). Are Endowments Fate? On the Political Economy of Coffee Exporting Economies. USC Department of Economics working paper.

[41] Pearse, A. (1975). *The Latin American peasant*. London, Cass.

[42] Postan NM. 1972. *The Medieval Economy and Society*: London

[43] Robinson, J.A. and J.-M. Baland (2000). Land and Power. working paper, Department of Politics, University of California, Berkeley.

[44] Sadoulet, E. (1992): "Labor-Service Tenancy Contracts in a Latin American Context," *American Economic Review*, 82, 1031-1042.

[45] Sokoloff, K. and S. Engerman (2000). "Institutions, Factor Endowments, and Paths of Development in the New World." *Journal of Economic Perspectives* 14(3).

Figure 1: Peasant Sector and Total Income under different market structures as a function of θ

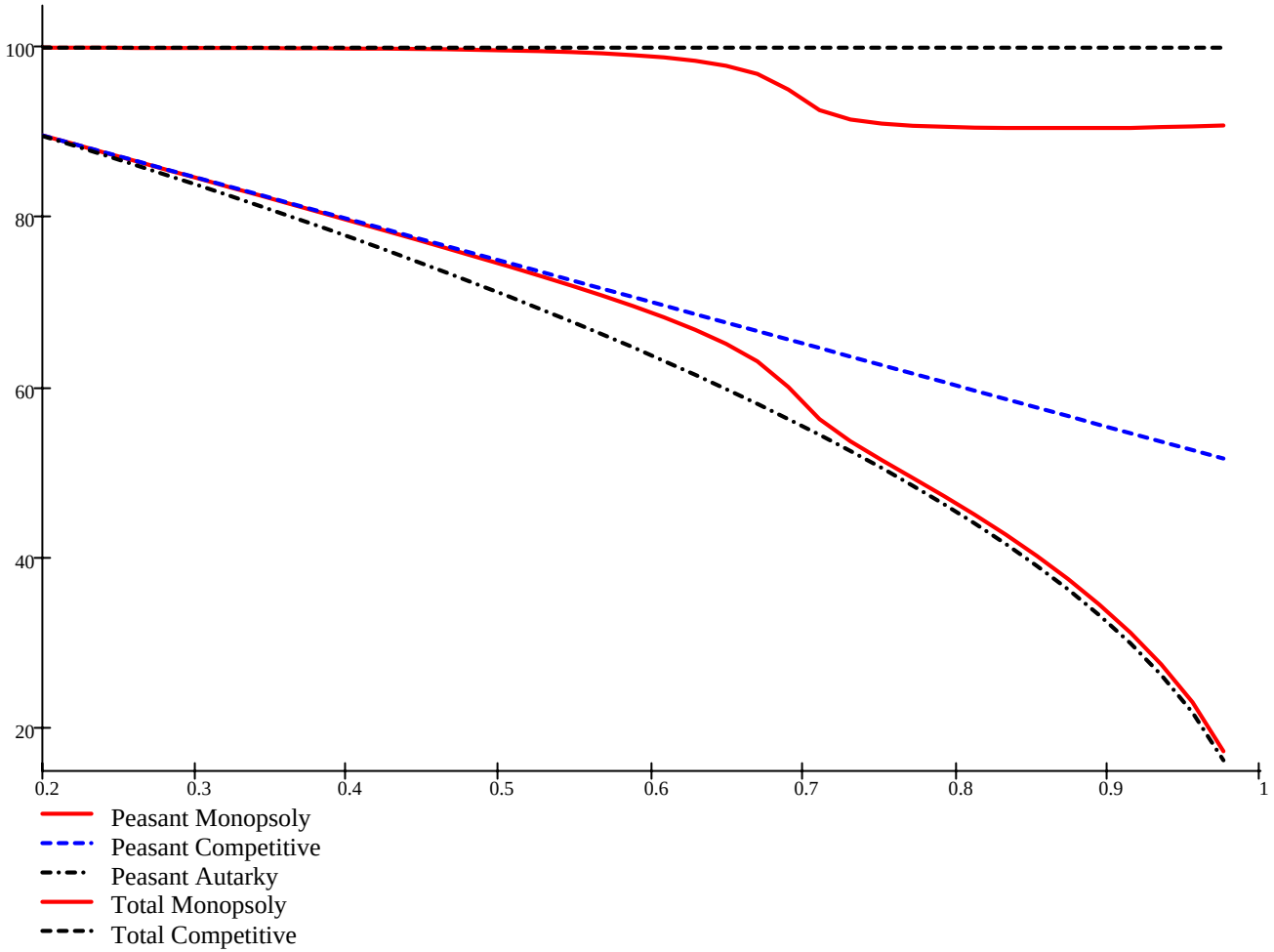


Figure 2: Equilibrium Net Factor Supplies as a function of θ

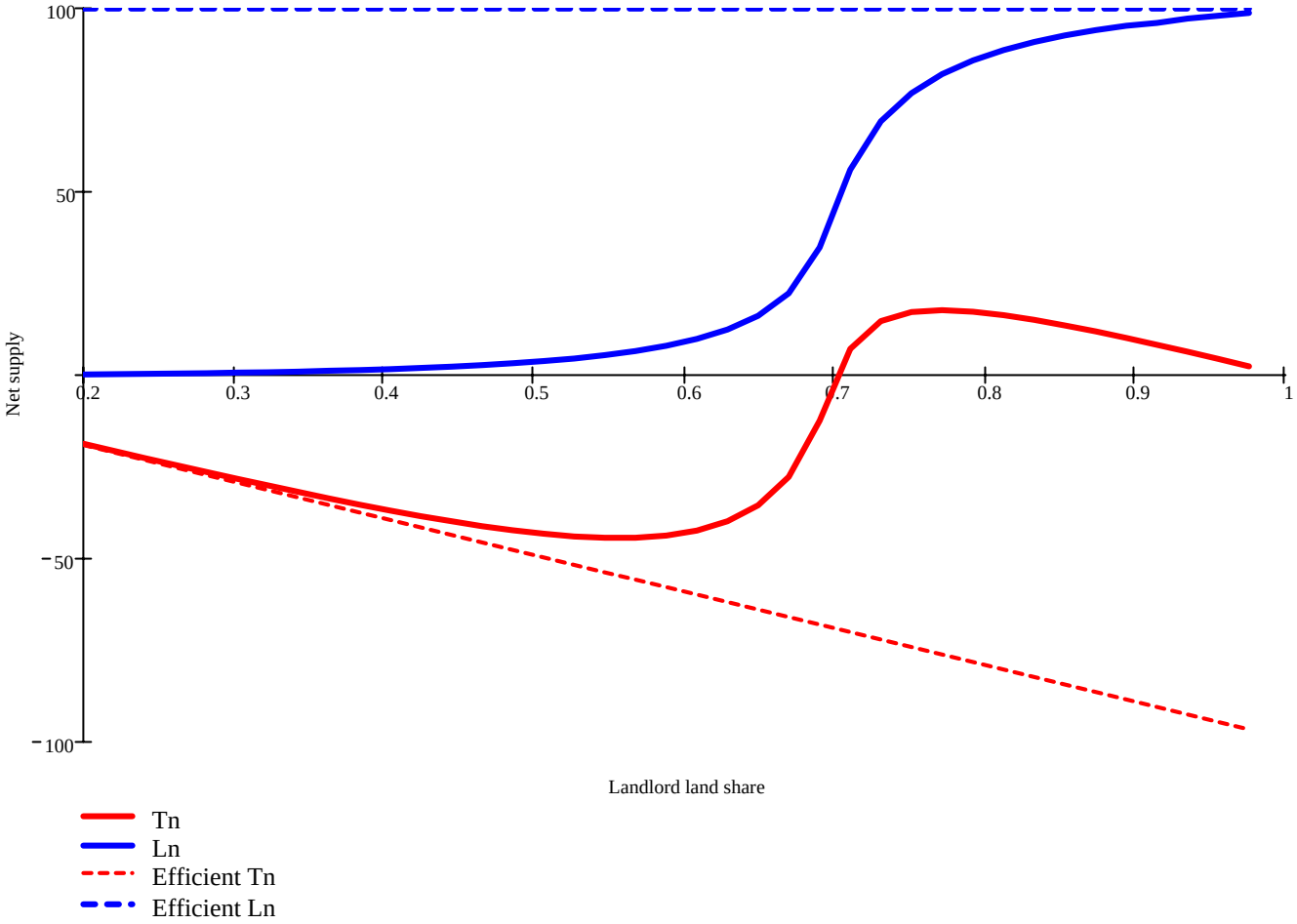


Figure 3: Equilibrium Wage and Rental rates as a function of θ

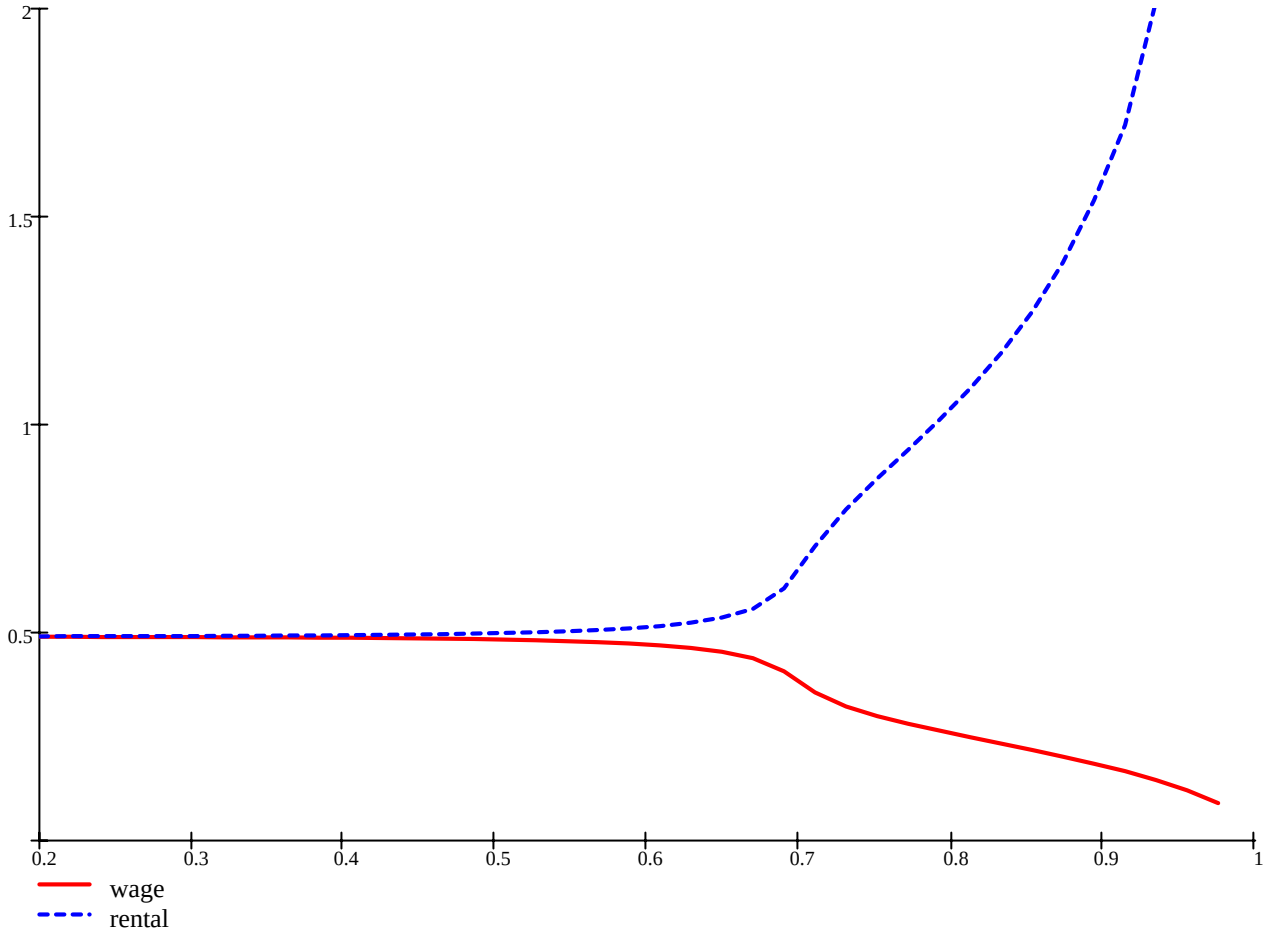


Figure 4: Equilibrium Land-Labor ratios as a function of θ

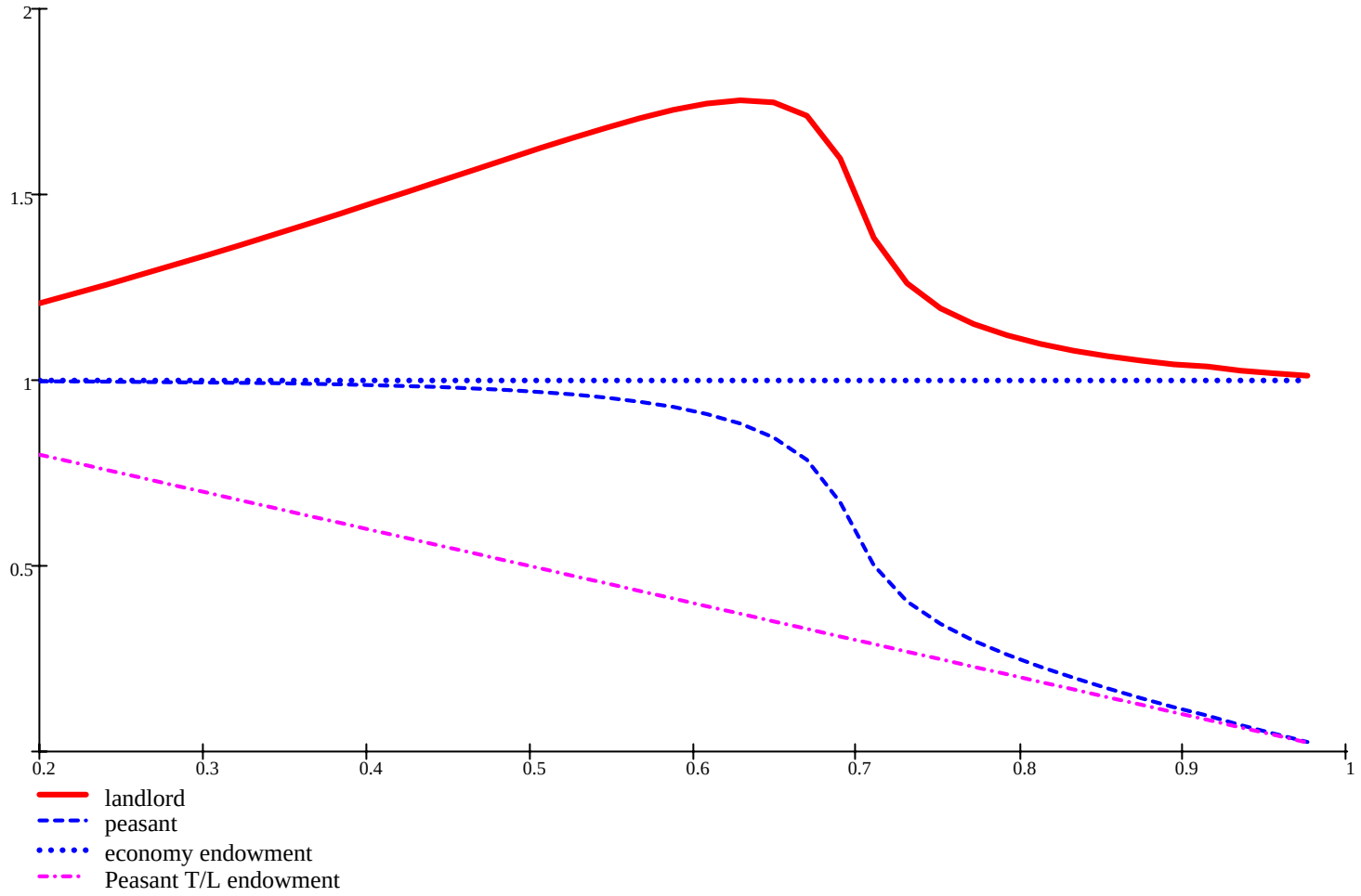
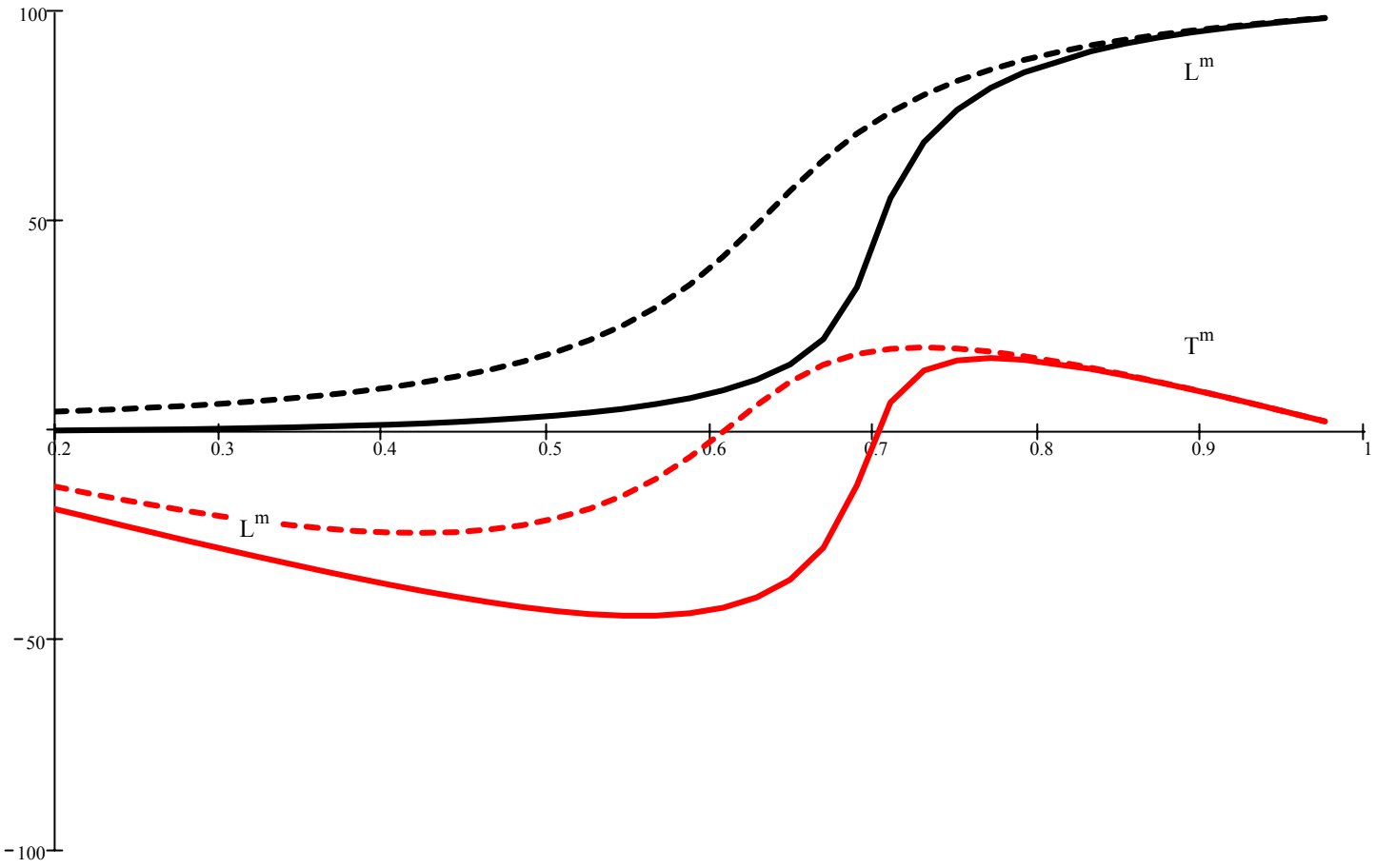


Figure 6: An increase in landlord skill can increase market power effects



Isoquant Edgeworth Box (landlord technology more land-intensive)