THE ECONOMICS OF HACIENDAS
AND PLANTATIONS IN LATIN AMERICA

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in Latin America.

I. Introduction

Some 15 years ago, Eric Wolf and Sidney Mintz applied anthropological insight to describe and differentiate between haciendas and plantations in the regions they knew best — Middle America and the Antilles.¹ Their differentiation is best summarized by their definitions. An hacienda, they stated, is "an agricultural estate, operated by a dominant landowner and a dependent labor force, organized to supply a small-scale market by means of scarce capital, in which the factors of production are employed not only for capital accumulation but also to support the status aspirations of the owner." By contrast, they characterized a plantation as "an agricultural estate, operated by dominant owners (usually organized into a corporation) and a dependent labor force, organized to supply a large-scale market by means of abundant capital, in which the factors of production are employed primarily to further capital accumulation without reference to the status needs of the owners."² The distinctions between haciendas and plantations are therefore several: size of market served and degree of specialization in production, capital intensity of production, economic motivation of owners, degree of control over labor force, and the use of personalistic social and psychological

¹Wolf and Mintz, 1957. (See bibliography at end of paper for complete references.)
mechanisms as means of binding the labor force to continued service.

The Wolf and Mintz study elaborates these various distinctions, drawing abundantly on anthropological and historical example. The result is a study of distinction that has stimulated and guided many subsequent researchers. Inevitably, however, the economist wishes that there were more economics in the effort. Thus the purpose of this paper is to give a more specifically economic treatment to the analysis of distinctions between haciendas and plantations. The result of this present effort is a model that does not merely describe such differences, but rather focuses on the basic factors that shape the character of both haciendas and plantations, and differentiate them from each other. The basic factor shaping the characters of both institutions, it is argued, is the degree of control exercised over the labor force. The basic factor of differentiation is product market price, not market size. Other distinctions, such as capital intensity of production and status aspirations or other aspects of owners’ economic motivation, are shown to be either derivative from more basic factors, or insignificant.

This paper also draws on historical and anthropological example to put flesh on the theoretical bones, and as before most of the examples come from the area known best to the author, in this case Peru. Additional examples are also drawn from the history of Mexico, the West Indies, and the southern United States.

A secondary intention of the paper concerns the wide gulf in Latin America that separates economists trained in the Anglo-Saxon neoclassical

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1 Including some research whose source of inspiration is obvious from the titles. See, for example, Miller 1957.
tradition from those whose training might be characterized as French, structuralist, and sociological. In search of harmony, this paper attempts to bridge the gulf by showing that neoclassical tools are useful in analyzing problems of structure, in this case tenurial structure. Economic theory has been described as a box of tools that must be used with wisdom in building new edifices. This box of tools is employed here to attempt a structure suited to the terrain of Latin America, particularly the windswept Peruvian Andes. Traditional houses of perfect competition don't stand up in such an environment, but it is hoped that other houses will prove quite comfortable.

This effort is by no means the first attempt at applying neoclassical economics to problems of Latin American land tenure. Many such studies, inspired by arguments over agrarian reform, have focused on productivity differentials by size of farming unit, generally concluding that very large farms are less efficient than small farms.¹ These studies have paid little attention to the special conditions involved in the maximizing process of the microeconomic unit, however. The maximizing process in peasant economies has received some attention,² but when we turn to economic studies of haciendas and plantations, the bibliographic list is short indeed.

The short list is characterized by distinct and original approaches. But, in my view, none of these past approaches seems likely to produce fully adequate insights. For example, a short article by Bottomley, drawing on Ecuadorian experience, explains the comparatively low intensity of land use

¹See, for example, Comité Interamericano de Desarrollo Agrícola 1966a, 1966b, 1966c, Cline 1970, Berry 1971, Hanson 1972.

²For example, A.K. Sen 1966.
on large haciendas as caused by shortage of complementary factors and imperfections in product markets. Large haciendas, it is argued, export mostly to the limited markets of nearby towns, and behaving like maximizing monopolists, they restrict the volume sold so as to keep the price high.

While product market imperfections are always a possibility, it remains true that a single hacienda hardly ever controls a monopoly position in the food market even of a local town. The best it can hope for is participation in a collusive oligopoly of haciendas. Low intensity of land use represents very weak evidence for the presence of collusion, since, as will be elaborated in the model that follows, such a land use pattern is much more easily explained by imperfections in factor markets, specifically, perfect monopsony in the labor market. Product market imperfections require more direct evidence, which is presently lacking.

A very different theoretical approach is taken by Shapley and Shubik, who use recent developments in game theory to describe mathematically the distributive outcomes possible under specified conditions of land tenure. Their formulations involve a high degree of generality, including as special cases both competitive solutions and the structurally constrained solutions of this paper. Other situations considered involve coalitions of workers (campesinos) formed in opposition to the owner (hacendado) or to other worker groups. The difficulty with the study, however, is the same as its virtue: a high level of theoretical abstraction. Lying embalmed in the terminology of game theory, it badly needs empirical illustration or verification to demonstrate usefulness.

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1Bottomley 1966.
2Shapley and Shubik 1967.
Finally, we must mention Best's model of a plantation economy, a model that carries an abundance of assumptions outlining the chief characteristics of West Indian plantations in both heyday and period of eclipse.\footnote{Best 1968.} Through these characteristics Best builds up an interesting description of the plantation as an ideal type, but in the end the relationships become so numerous that they are too cumbersome to manipulate in the search for new insights. Thus the benefits of model building seem sacrificed to an enthusiasm for detail.

The paper proceeds in four sections. The next part presents a model of haciendas and plantations. Following that, Section III presents evidence from various historical studies, supporting the viewpoints formalized in the model. Section IV suggests some variations on the model as shown by recent anthropological work in Peru, and finally Section V offers some concluding comments.

II. A Model of Hacienda and Plantation

The archetypal hacienda appears self-contained, a world of its own as Tannenbaum reminds us,

"That is the aim of hacienda organization: to buy nothing; to raise and make everything within the limits of its own boundaries. ...The llamas that graze in the hills, the oxen and the horses are raised and broken where they were born. The saddles, bridles, and harnesses are made from the hides of the slaughtered animals. The wooden plow, the wagon, the windmill for the grinding of the corn, or the water mill for the grinding of cane are all fabricated locally. The table may be loaded at a meal with every kind of meat, grain and fruit, and all of these - the table, the house, and the servants as
well will have been raised, contrived, conserved,
grown on the place.¹

Tannenbaum’s words depict the economic side only of the hacienda’s internal relations. In its dealings with the outside world the hacienda presents a very different face; it participates actively in a monetary economy, selling the surplus of the hacendado’s fields, buying goods for the hacendado’s consumption. Referring to colonial haciendas, Macera thus emphasizes this contrast in roles:

"La hacienda remained located on the border of two economies, and of two social sectors... capitalistic business toward the outside, semifeudal social system on the inside. The hacienda thus coordinated two formally contradictory systems."²

The hacienda of recent years has retained this ambivalent character.³ It has done so through dominating a wide tract of land, not all of which it need legally own. Within this tract lie not only the lands of the hacienda itself but also the small plots from which the hacienda’s labor force obtains part of its livelihood.

Some plots (minifundios) may be owned by the hacienda with usufruct granted to the campesino, in return for which he must work the hacienda’s fields a stipulated number of days per week. Other plots adjacent to the hacienda’s lands may be owned by an indigenous community and administered

¹Tannenbaum. 1962, p. 81.
²Macera 1971, p. 38.
³Vasquez 1961, pp. 21-22.
either as communal property or as private property of individual campesinos. All plots are small, insufficient to occupy all the time of the campesino's family and incapable of providing sufficient income. The only other available employment alternative is the hacienda itself. This condition defines the hacienda's domain, the tract dominated by the hacienda. This domain is best thought of not as a given area of land but as a given labor force, totally immobile and having no other alternatives.

The labor force must be prevented from leaving the hacienda, either by legal prohibitions (e.g., slavery, debt peonage) or by ignorance. As Tannenbaum stresses, haciendas are isolated, with poor transport and communications links to the outside world. Poor communications means that laborers don't leave; it also means that new ideas don't arrive, and so technology in use is primitive. Poor transport means that trade between the hacienda and the rest of the world is limited. The marginal value product of crops produced for export is low, since transport costs must be deducted from prices reigning in distant markets. The hacienda's lands are worked extensively; indeed for simplicity we may assume that land is a homogeneous free good on the hacienda, some land being idle for lack of a labor force to work it. Not so on the minifundios: There the land is scarce and worked intensively.

These various assumptions are incorporated into Figures 1 and 2.

Figure 1 shows a marginal value product curve for the hacienda, which we may abbreviate as the H curve. It is horizontal, not subject to diminishing.

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1For recent data on allocation of the campesino's time between minifundio plots and outside employment, see CIDA 1966c, pp. 268, 270. Also extensive unpublished surveys by Comité de Apoyo y Coordinación de Reforma Agraria (COMACRA) for 1970-71. Some COMACRA results are summarized in Webb 1972, pp. 24, 47.
Figure 1

Figure 2
returns, because in its primitive technology the only other factor combined with labor is land, a free good over the range considered, and because the hacienda's output has negligible effect on prices in distant markets. Labor is subject to sharply diminishing returns on the minifundio, however. The $M$ curve is an aggregative curve of all minifundio plots within the hacienda's domain. Land in those plots is fixed in amount and scarce, so scarce that working full-time on the minifundios would drive the marginal product of labor to very low levels. However, if the minifundios were farmed extensively, i.e., if labor use were low, marginal value product would be higher than on hacienda lands, since the food crops grown on minifundios would be costly to import.

Figure 2 measures minifundio labor horizontally from origin 0 as before, but now the hacienda diagram is turned around with labor measured from right to left and origin at 0'. 00' measures the fixed total labor supply of the complex, each point on the line representing a different division of labor time between hacienda and minifundios. A wage OS is added to the diagram, so the area OSS'O' represents the total wage bill.

Now we come to the economic significance of a landlord's having complete control over the labor supply. Within wide limits, he can set wages and labor requirements any way he likes without diminishing the total labor supply available to the hacienda-minifundio complex. He need only ensure that total campesino income is at least as high as subsistence but not so high as to cause man-hours to be lost through the increased consumption of leisure. Subsistence need not be a biological minimum marking the edge of

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1 If we chose to draw the $M$ curve concave to the origin, as is often done, then the diagram would show the possibility of driving labor's marginal product to zero or less than zero. We have no real knowledge of the curve's shape, however, and draw it concave to make it correspond to the form of commonly used linear homogeneous production functions. See the Appendix for elaboration.
starvation; it may instead by culturally determined. In either case its significance lies in the idea that the system cannot continue functioning if income is pushed below this floor. If the campesinos did not starve at a lower income, at least they would mobilize, or flee.\footnote{\hspace{1em}}

Consider the landlord's behavior with respect to legally unencumbered laborers from the indigenous community. He can set wages but has not contractual right to such labor. No matter; the pressures of economic necessity can accomplish his purpose, provided that minifundio plots are too small to furnish subsistence by themselves (OABO'<OSS'O' in Figure 2), and that the hacienda is the only alternative source of income. This is the case in Figure 2; the landlord having set the hacienda's wage at O'W', campesinos choose to maximize their income by devoting OD of labor time to minifundios and DO' to the hacienda. Total campesino income is OACD from the minifundios and DCW'O' from the hacienda. In the geometry of the diagram, OACD plus DCW'O' equals OSS'O'.

Besides having power to set wages, the hacienda can also control the size of minifundios. No problem exists in expanding them; the hacienda can merely make some of its abundant land available. Changing minifundio size in the other direction takes more time and turmoil, but an abundance of historical evidence supports our assumption that the hacienda can also oblige minifundios to contract, through rewriting rental arrangements if it holds

\footnote{\hspace{1em}The subsistence concept could be abandoned entirely if we were to assume labor mobility. Then the minimum acceptable income would be determined by wage levels outside the hacienda. This case would make additionally necessary the restriction on the campesino's utility function that the quantity of leisure consumed remains invariant with respect to income. This restriction is required to preserve the convenient condition that total labor supply is also invariant.}
legal title to the land, through usurpation if it does not. However, such a situation always indicates that profit would be greater still if minifundios could be contracted. The hacienda seeks to adjust minifundios to the size at which hacienda profits are maximized; when that size is achieved, the profit maxim is associated with subsistence income for campesinos.\footnote{I am indebted to Douglas Enobank for pointing this out.}

For a given minifundio size, hacienda profit (CEH′′′ in Figure 2) may be maximized at a wage that causes campesino income to be greater than subsistence. This would be the case if further wage reductions would cut greatly into profits by reducing the hacienda's labor supply.\footnote{The condition under which this condition would exist is derived as follows. Profits are maximized at some income above subsistence if at an hacienda wage corresponding to subsistence profits are a decreasing function of labor devoted to the minifundio. That is, \( \frac{\partial \pi}{\partial L} < 0 \) where \( \pi = (H - h) (L - L) \), and \( \pi \) is profit, \( H \) and \( h \) are marginal products of labor on hacienda and minifundio, \( L \) is total labor supply and \( L \) is labor on the minifundio. Differentiating with respect to \( L \) and shifting about terms gives \(- (\partial \pi/\partial L) < (H - h) / (L - L) \). In terms of Figure 2,\( \frac{\partial \pi}{\partial L} \) is the slope of tangency at \( C \), and \((H - h) / (L - L) \) is the slope of the diagonal connecting \( EH' \). As the figure is drawn, the slope of tangency at \( C \) is the steeper, so the condition is not satisfied, i.e., profits are in fact maximized when campesino income is driven down to subsistence.}

A moment's thought shows that this profit maximum involves land and labor being allocated partly to minifundios and partly to the hacienda itself. If no land and labor were allocated to minifundios, for example, then the hacienda would become a plantation, with workers devoting their full time to wage labor. But for this they must be paid a subsistence wage, and in
Figure 2 subsistence wage exceeds marginal value product of labor on hacienda lands. The hacienda turned plantation would lose money, so clearly zero is not the optimum size of minifundio land. At the other extreme, if all land and labor were allocated to minifundios, then clearly hacienda profit would be zero. The profit maximum must lie within the extremes. This indeed is the case in Figure 3, which presents a few illustrative curves relating hacienda profit to labor force allocation. The shape of such curves depends crucially on assumptions about the productivity of labor on the hacienda and the form of the minifundio's production function. The particular assumptions underlying the curves in Figure 3 are elaborated briefly in Table 1 and at greater length in the Appendix.

Suppose that the hacienda has adjusted both wages and minifundio size so that profits are maximized, but that the profitability of hacienda operations then increases, through either technical change or a sustained increase in world prices for the hacienda's export crop. How will the hacienda readjust?

Consider the wage adjustment, holding minifundio size constant for the moment. If the hacienda had been maximizing profits beforehand, then it had determined that the extra labor obtained by offering a higher wage wasn't worth the loss in profits caused by paying that same higher wage to all labor already working the hacienda lands. However, when the H curve rises and hacienda operations become more profitable, the gains from offering a higher wage also become greater. If the H curve rises high enough, the hacienda will find it profitable to raise wages in order to capture a large share of available labor services. The wage increase may begin
<table>
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<th>π max</th>
<th>(Lm/L) max</th>
<th>(w/Ś) max</th>
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<td>(5)</td>
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<td>200</td>
<td>(1.202)</td>
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Note: α is output elasticity of labor in minifundio production function of Cobb-Douglas form, H/Ś is marginal value product of labor on the hacienda expressed as percent of the subsistence wage. π max is maximum profit obtainable under specified conditions, in units such that profit share of total output is π/(1 + π), (Lm/L) max is the percent of total labor time devoted to minifundio production under profit maximization, (w/Ś) max is the hacienda wage under the same condition, also expressed as percent of the subsistence wage, and Dm is land allocated to minifundio production.
Figure 3
(Numbers in parentheses refer to rows in Table 1.)
immediately with the upward drift of the H curve or may commence only with a delay. Once begun, the wage may drift up gradually or may jump discontinuously so that the hacienda suddenly shifts to a new regimen of higher wages and higher total campesino income, with substantially less time devoted to minifundio cultivation. Again, these various possibilities depend on the form of the minifundio production function, in particular on the elasticity of the marginal product curve. But no matter what the shape, the final result is the same: If production on hacienda lands becomes sufficiently profitable, wages will rise to the point where minifundio production is abandoned, campesinos specialize themselves in working the landlord's land for wages, and the hacienda becomes a plantation.

In fact, the minifundio size will not remain unchanged. The rising H curve will set up pressures to reduce minifundio size. Rising wages without minifundio contraction cause campesino income to rise above subsistence. At any new higher wage level the hacienda would find greater profit by contracting minifundio size until campesino income is driven back to subsistence, since by this process additional labor would be made available to the hacienda. Therefore the tendency toward conversion from hacienda to plantation operates by two means: increases in wages and reduction in size of minifundios.

The process may be seen in the illustrative calculations of Table 1. Suppose case 1 changes into case 3, i.e., the H curve shifts upward, from 75% to 125% of the subsistence wage. Profits rise from 5% to 25% of total output. The share of total labor time devoted to hacienda operations (Lm/L) rises from 37% to 74%. This is accomplished by raising wages, from 61% to 79% of subsistence, and also by contracting land allocations to the minifundio by 30% ((.949 - .661)/.949).
When agricultural production becomes very profitable, haciendas become plantations. Haciendas are a means for making the best of an inherently unprofitable situation by taking advantage of labor's higher productivity in subsistence food production. Figure 2 is drawn in such a way as to emphasize this point: The subsistence wage OS is above the H curve. That is, as a wage-paying plantation the particular enterprise would go broke, but as a symbiotic hacienda-minifundio complex it earns a profit.

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1 This higher productivity is indicated in Figure 2 by the portion of the H curve that lies above the H curve. It should be remembered that the position of the two curves is partly determined by relative prices of food consumed as compared to the hacienda's export crop. Therefore the curves are not strictly independent of one another. When the H curve rises and haciendas are induced to compress the size of minifundios, then minifundio production generates a smaller share of subsistence income, and the relative price of home-grown food rises, so the H curve rises as well. The limit of this adjustment is reached when minifundios are eliminated, all food is imported, and relative prices within the hacienda equal the external terms of trade. If part of the H curve based on external prices lies above the H curve, then the hacienda's profit maximum lies at some point short of complete specialization in a plantation. This is so even though the H curve based on actual relative prices lies nowhere above the actual H curve. This particular refinement, it should be noted, is of significance only when home-grown food and imported food are imperfect substitutes, whose relatives prices change with changes in relative supply. Since the refinement is not dealt with in this paper, the model as presented carries the implicit assumption that "food" is a homogeneous good, such that when any portion of local supply is imported, the external terms of trade apply locally.

2 This line of reasoning differs from the argument of Griffin, who used Ecuadorian data to show that hacienda profits are high when expressed as a percent of the value of output exported from the hacienda. (Griffin 1969, p. 73). This profit rate presents difficulties of interpretation, however. One might imagine an hacienda so primitive and unproductive that the hacendado purchases no inputs and extracts only one bucal of wheat annually for his efforts. Griffin's measure would show a profit rate of 100%, yet the hacienda would be virtually worthless to the hacendado. Hobsbawm (1969, pp. 42-43) does not escape the problem by citing figures on profit as a percent of the hacienda's market value, since the market value adjusts until the resulting rate merely reflects what hacendados can earn in non-agricultural pursuits. In fact, the concept of profit rate simply doesn't apply to an hacienda. The customary measure that relates profits to book value of invested capital produces a rate of infinity, since, by the assumptions of this model, there is no capital investment. Profit rates mentioned in this paper (r/(1 + r)) are in fact distributive shares.
In maximizing profit the hacienda does not maximize total output. Labor's marginal product on the minifundio equals the hacienda's wage, but is less than labor's marginal product on the hacienda. Labor is allocated inefficiently between minifundio and hacienda, the minifundio being more intensively cultivated. Far from showing the hacienda not to be profit maximizer, however, this social inefficiency is the very device that permits the hacienda to maximize profits.

Finally, consider the alternative institutional arrangement mentioned earlier, under which the hacienda holds legal title to minifundio land and requires labor services in lieu of rental payments. Suppose now that the hacienda can adjust required days of labor service as well as wage rate and minifundio size. Then, for any given minifundio size, the hacienda will demand a quantity of labor services such that marginal products on minifundio and hacienda are equalized. This is shown in Figure 4, where the hacienda requires \( F_0' \) of labor instead of the amount \( D_0' \) furnished in the previous case of a voluntary working decision. If the hacienda paid the same wage of \( O'W' \), total campesino income would decline by the size of triangle KCG. If total income was at subsistence previously, however, then an income loss cannot be permitted. Wages must be increased so that \( GJW'W' \) equals KCG, thus returning campesinos to subsistence. Total output has increased, however, by the area of triangle KEC; this extra profit accrues to the hacienda from its right to control quantity as well as wage for labor services. It represents the efficiency loss under the previous regime of voluntary labor, for control of labor quantity permits the hacienda to equalize the marginal products of labor on minifundio and hacienda without having to set the wage equal to either one. For any given size of
minifundio land, therefore, maximum profit is greater than in the inefficient case of voluntary labor. As before, the maximizing hacienda compresses or expands minifundio land until arriving at the maximum maximorum, the campesinos remaining, as before, at subsistence.

This example would be brought closer to the dominant tradition of the Peruvian Sierra if we remove one variable from the hacendado's control by assuming that the wage paid for working the hacienda's fields is zero. This self-imposed constraint has probably been viewed by hacendados as necessary for maintaining labor immobility, since it serves to isolate the campesino from the money economy.¹ In this case, the condition of profit maximization is readily stated. By figure 4, land granted for minifundio use must be of such size that the area OAKF equals subsistence, hacienda profit being F(KH'O).

Having made our passage through the model, we may refer back to the beginning and see how we come out differently from the original study of Wolf and Mintz. To begin on a harmonious note, this Wolf-Mintz description of the uses of land fits perfectly with the viewpoint of this paper:

"The hacienda must also attempt to monopolize the supply of land in its immediate vicinity. It needs this land less for purposes of agricultural production than to deprive its laborers of economic alternatives to participation in hacienda operations. It preempted

¹At least one hacendado in the central Sierra of Peru overlooked this factor to his grief. While forbidding his laborers to travel, at the same time the hacendado at Tiingo in the Yanamarca Valley required that they transport his produce for sale in a nearby town. Ideas acquired through these trips are judged an important factor in the development of unified action that eventually led to the formation of a peasant syndicate and the expulsion of the hacendado. See Tullis 1970, pp. 93-94. Alberti 1970, pp. 175-182.
the agricultural resources to prevent any independent agricultural activities from being carried out by its potential labor supply; and it attempts to bar its own labor force from seeking economic independence outside the limits of the hacienda by cultivating land not owned or controlled by the hacienda. 1

Viewpoints diverge, however, on the role of capital, for Wolf and Mintz state that:

"...it is lack of capital rather than lack of labor which constitutes the specific initiating condition for the emergence of the hacienda... Even where the hacienda may be able to increase in population by internal growth, it will not thereby turn into a plantation without further investment of capital. Similarly a plantation -- retaining all of its workers -- may well turn into a hacienda if it loses its capital." 2

A plantation, being more in contact with the world of commerce, may more readily acquire ideas about new, lower-cost, capital-using technologies. But it would remain a plantation even if it persisted with traditional, labor-intensive ways of doing things. Furthermore, most capital found on both haciendas and plantations takes the form of irrigation works, graded fields, and other works constructed by the local labor force. Under these circumstances, fixed capital destroyed can always be replaced.

One suspects, however, that Wolf and Mintz are really talking about working capital, especially since they go on to write:

1Wolf and Mintz 1957, p. 389.
"...the plantation entrepreneurs need capital to set up a productive organization capable of meeting the demands of an existing market, or to expand those markets by advertising and selling. The demands of the plantation for capital are very much greater than those of the hacienda since it is usually geared to large-scale markets, often supra-national in scope."¹

It is not fundamental to the nature of plantations, however, that they must serve distant markets and finance all distribution costs themselves. Some serve national markets; others serving world markets sell to intermediaries. For example, the cotton plantations of Mexico and Peru have traditionally relied on intermediaries like Anderson Clayton and La Fabril for all marketing. Their working capital needs have been confined to the crop season alone—advances for wages and input purchases to be repaid when the crop is sold. This type of working capital is equally required by the hacienda, but financed by the campesino himself as he makes his food stocks last from one harvest to the next. Haciendas are therefore not fundamentally differentiated from plantations by conditions regarding either fixed or working capital.²

Wolf and Mintz also differentiate haciendas and plantations by the size of market served, the hacienda selling to small local markets, the plantation to mass markets.³ While haciendas and plantations are often

¹Ibid, p. 396.

²It remains true, of course, that if distribution channels collapsed the plantation would tend to become an hacienda. This change should be viewed not as a question of capital but of market price, where price is for hacienda, i.e., "precio en chacra."

³Wolf and Mintz 1957, p. 388.
differentiated in this way, one need only think of the wool-growing haciendas of southern Peru to realize that haciendas also sell to world markets, and that this market distinction is not fundamental.¹

Finally, Wolf and Mintz distinguish between haciendas and plantations on the basis of owners' status aspirations they write:

"...The hacienda owner can express his status needs more easily by expending labor than by expending wealth. Lavish use of labor power thus tends to become the chief way in which the hacienda owner maintains his privileged position within the social group to which he belongs... Where emphasis is placed on the conspicuous consumption of labor, the ability of a hacienda to generate capital for reinvestment and growth may be affected in turn. One should not lose sight of the fact that the hacienda was organized to produce agricultural goods for a market. Yet one of the functional implications of this type does seem to involve the diversion of the factors of production to non-economic ends. The situation contrasts sharply with that of the plantation where decisions are made not in terms of the prestige or consumption requirements of one owner, but in the expectation of maximum returns on invested capital."²

The image of hacendado as shiftless, status-seeking non-maximizer is often drawn, probably often exaggerated, and not well substantiated by the phenomena mentioned in this passage. In fact, the hacienda is not organized to produce agricultural goods for a market. It is organized to produce a high

¹Piel 1967 recounts the impact of world market price fluctuations on these wool-growing haciendas.
²Wolf and Mintz 1957, p. 393.
consumption level for the hacendado. In the market basket that confronts our hacendado consumer, labor services are priced very cheaply, as indicated by the hacienda's low marginal value product of labor. Faced with such a bargain, it seems economically quite reasonable that the hacendado would consume large amounts of labor services. Certainly such consumption detracts from capital formation, but so does any dividend declared to shareholders.

In all these respects, the plantation is no different. It too seeks to maximize the consumption levels of shareholders, and this it does by converting labor effort into agricultural output. Once dividends are declared, they permit shareholders to consume lavishly in their own style, having account of the different relative prices in the market basket before them.

It should also be remembered that in many historical instances the plantation has been no different in its lavish use of labor services. Describing Caribbean society in the eighteenth century, Ragatz has recounted the prodigious gluttony of everyday dining in the plantation's big house, all accomplished at meals in which each diner was attended by his own personal servant.¹

Again, we conclude that status aspirations do not differentiate haciendas and plantations, and return to the conclusion of the model, that the fundamental differentiating factor is f.o.b. market price.

¹Ragatz 1928, pp. 7-8.
III. Evidence from History

The challenge and dilemma of early Spanish colonial policy is perhaps best summarized in Domar's comment that 'of the three elements of an agricultural structure...free land, free labor, and non-working landowners -- any two elements but never all three can exist simultaneously. The combination to be found in reality will depend on the behavior of political factors.'

In newly conquered Spanish America, a non-working landowning class was definitely in the plans. Land was abundant, increasingly so relative to labor as indigenous populations were diminished by disease, war and cultural disruption following the Conquest. Labor, then, could not remain free. Institutions for controlling the labor force had to be developed.

The encomienda may be considered the first such institution. A Castillian tradition transferred quickly to the New World, its essence came to lie in the assignment of Indian tribute payments to newly designated Spanish lords. Since payment could be made only in specie or in specified agricultural products required for the supply of cities and mining regions, tribute caused labor to be diverted from indigenous subsistence activities, to the service of the superimposed Spanish economy. The encomienda did not however permit the indigenous economy to continue functioning more or less independently. The encomendero was a tax-collector but not a landowner; hence he did not supervise production processes. Compared to the model of this paper, the encomienda bears only faint resemblance. Indian campesinos were obliged to devote part of their labor time to the service of their lord, but through fiscal rather than economic necessity.

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The encomienda is much-studied as a political institution, since it created an independent feudal aristocracy threatening to the state’s authority. That threat caused the Crown never to grant encomiendas in perpetuity and eventually to do away with the institution. As an economic institution the encomienda has been studied not only in its manner of operation, but also in its relation to other institutions of labor control that succeeded it.

The weight of scholarly evidence holds that the colonial hacienda was not a direct descendent of the encomienda. To be sure, after the passing of encomiendas the former encomenderos often landed on their feet as powerful hacendados in the same region, but to do this they had to obtain land titles in some way. Such titles were most frequently obtained by merced, outright grants by Crown or cabildo, often facilitated by an encomendero’s influence, but acquisition by purchase, occupation or marriage is also recorded. On the other hand, many encomenderos failed for one reason or another to continue as hacendados, while many haciendas were acquired by non-encomendero. For encomendero and non-encomendero alike, undisputed legal titles often resulted from questionable occupations or seizures, merely by payment of a special tax at moments when the Crown in its financial desperation permitted such opportunity. Those special moments came mostly in the seventeenth century.

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1Zavala 1943, pp. 69-79.
2See, for example, Zavala 1949. Also Lockhart 1969, Keith 1971.
4Dowe 1957, pp. 161-182.
Labor services were also coerced from the indigenous population more directly through forced labor, institutionalized in Peru as the mita. Like tribute, the mita was also an Inca institution quickly adapted to Spanish purposes. Mitayos were directed principally to the mines, but they also served in haciendas, obrasjes and public works, generally for periods of about four months.\(^1\)

Despite the early spread of encomienda and mita in a context of escalating demand for labor, control over the potential Indian labor supply remained disorganized in the decades following the Conquest. Encomiendas and mita obligations applied only to natrununas, the peasant class of the Inca state, since this was the only class held liable for tribute and mita under the Inca system. The other laboring class, the Yanaconas, had served as servants and craftsmen under the Incas, their status lower than that of the Natunrunas. With the coming of Spanish rule, their traditional condition of exemption from tribute payments and mita made their status an envied one. Natunrunas willingly became Yanaconas, and had the opportunity to do so by escaping their previous identity during the turmoil of Spanish power consolidation.\(^2\) Their numbers swollen, the Yanaconas became, in the words of Kubler, "a rootless, floating proletariat."\(^3\)

Additional measures of labor control were called for and formed part of the administrative consolidation achieved by the Viceroy Toledo in the 1570's. A series of rulings established control over the Yanaconas:

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\(^2\)Rowe 1957, pp. 175, 180-181.
\(^3\)Kubler 1946, p. 378.
The creation of new Yanaconas from among repartimiento Indians was forbidden in 1571; . . . all vagrant Yanaconas were to be assigned to masters; . . . no Yanacona might leave his employ, or be expelled from it without proper license.\(^1\) Thus every Indian in Spanish Peru was assigned a status, and a master. There were of course Indians who escaped the system, mostly by fleeing to remote regions on the very frontiers of the Viceroyalty. Within the more centrally located areas, however, control was made vastly more effective by obliging Indians to move from scattered and remote dwellings into reducciones. At the same time the mita was regularized, limited at any time to a seventh of tribute-paying Indians in each village.

Privately owned estates could flourish only after a labor supply had been assured. Land title without an associated supply of Indian labor was worth nothing, since most Spanish colonists had no intention of working the land themselves. Before Toledo's consolidation, forced labor deliveries under the mita had proved too unreliable for most estates, particularly since the Indian population was passing through the demographic disaster that reduced its numbers from perhaps 4 millions at the Conquest to little more than one million in the time of Toledo. Confronted with such difficulties, many beneficiaries of early land grants abandoned their farming efforts. In the valley of Chancay, for example, most of the original recipients of mercedes distributed in 1562 sold out in short order. The few surviving grantees consolidated the holdings of those who failed to form the valley's great haciendas.\(^2\)

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1Ibid.

While some failed, others searched for alternative means of acquiring a labor force permanently under their control. In a few areas of Peru, the answer was found in Negro slaves, but slaves were costly, profitable only if a profitable cash crop could be produced. In other words, Negro slaves, being unaccustomed to local subsistence agriculture, could be used only if the hacienda became a plantation capable of paying a subsistence wage. Sixteenth century Peru gave promise of such profitability only in sugar estates, in wine making, or in locations close to Lima’s urban market.¹ Elsewhere, the best hope of acquiring a permanent labor force lay in the acquisition of Yanaconas. The methods for the recruitment of Yanaconas were various: like kidnapping, like petty inducements, and small gifts, with the result that all the skilled labor of a given community might be drained from it into the Yanacona class.² Once acquired, Yanaconas became immobilized through the administrative edicts of Viceroy Toledo, and one foundation of a controlled labor supply was established.

Other elements of control were continued or developed. The re-organized mita continued to supply laborers for agricultural and pastoral pursuits, with such regularity that an hacienda’s customary allocation of mitayos came to be capitalized into its market value.³ Besides this, free laborers resident in nearby indigenous communities were contracted for work,

¹Keith 1970, pp. 40-41. Macera 1971, pp. 17-19. By 1613, however, export prospects were sufficiently developed in the valley of Chancay that African slaves supplied most of the estate labor and represented 43% of the valley’s total population. See Rodriguez Pastor 1969, p. 91.
²Kubler 1946, p. 377.
³Macera 1971, p. 31.
granted advances, and drawn into debt peonage through judicious control of the account books. Payment was generally made in kind through the hacienda's store at arbitrary prices, and thus debts could quickly be built up to exceed wages. When the legitimacy of passing debts on to children was established and arrangements made for preventing escape, the circle was closed. Over time the debt peons became indistinguishable from the Yanacona class.

The mita was abolished after the rebellion of Tupac Amaru, but control over Yanaconas continued past the colonial period, into republican Peru, and even up to the middle of the twentieth century. While colonial control edicts no longer held, the same purposes were accomplished through debt peonage, and through the inability of campesinos to seek redress when all reins of local government remained in the hands of the gomonales -- the hacendados and their allies. Even the tempestuous arrival of APRA into national political life failed to disturb local power structures. The weight of evidence holds that APRA, for all its rhetoric, in fact established a modus vivendi with gomonalismo that left the Indian to his centuries-old fate.

Descriptions of social relations and labor control on haciendas of the Peruvian sierra in the 1930's, 1940's or even early 1960's showed striking similarities to their colonial antecedents. Resident laborers -- often still called yanaconas -- continued performing various services for

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2. The literature on Aprismo fills volumes and libraries. The best general survey is Bourricand 1970. For a distinctive discussion of APRA and gomonalismo, see Ravines 1951, pp. 95-99.
the hacendado as payment for the privilege of farming a minifundio plot. The services generally earned no compensation and were numerous: personal service in both the hacienda’s main house and in the hacendado’s urban residence (pongueaje), care of animals, transport of goods. The largest burden, however, involved working the hacienda’s fields. The total burden was considerable. Until the early 1950’s Haciendas Tingo and Chuquishuari (Junin) required 6 days of service per week from each yanacona. Nearby, Hacienda Yanamarca required only four. As late as 1964, newly formed peasant syndicates in Paucartambo (Cuzco) achieved agreement to end pounceaje and limit labor requirements to 12-15 days per month, instead of previous arrangements under which the hacienda could draw on as much unremunerated labor as it wanted, until the work of the hacienda was done.

Frequently labor requirements and other charges assumed such complication as to be unexpressable in days per week. On the rice haciendas of coastal Puri in the 1930’s, yanaconas paid fixed land rent in rice, additional rent in rice for use of the hacienda’s equipment and loan of seed, additional implicit charges in forced sale of rice surplus to the hacienda at an artificially low price, plus gratuitous labor services for canal cleaning, canal repair, care of livestock, and cultivation of hacienda’s rice fields. In the valley of La Convención in the 1940’s, labor obligations

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4 Castro Pozo 1947, pp. 24-25, 30-32. Reprinted newspaper articles from 1934. Subsequent condition of yanaconas after their status had evolved into a form of share tenancy is described in Rodriguez Pastor 1959, pp. 177-193, 275-276.
included regular field work (8-10 days per month), one woman picker for each coca harvest, one 10-15 day annual levy for major repair work, pongua'je, and transport of goods, plus occasional additional levies as called for by the hacienda.¹

The impact of such labor regimes on hacienda profitability is neatly illustrated by a case cited by Vasquez:

"In 1958 an hacendado from Cuzco who had harvested 80 cargos of maize and sold it for S/.4,800 was thought to have turned a fine profit, since the sale value returned entirely to him as profit. On investigating the process of maize cultivation that involved no purchases of new seeds or fertilizers, it was concluded that the sales value was less than imputed production costs (S/.5,400) of the labor contributed by peons during the various stages of cultivation."²

In other words, labor's marginal product on this hacienda (the H curve) was less than a subsistence wage, the hacienda was surviving economically only through its peculiarly effective mechanism of exploiting labor.

Institutions for catching runaways had long since disappeared, but isolation from the world beyond the hacienda rendered resident laborers unlikely to attempt escape. Prohibitions on travel preserved yanaconas in ignorance.³ So did the practice of preserving haciendas as strongholds of

²Vasquez 1961, p. 22. One cargo equals about 450 lbs.
³See footnote 15 above.
indigenous culture, where overseers always addressed laborers in Quechua, never in Spanish.\(^1\) The condition of the yanacona was perhaps most vividly put by the Mexican Saenz, who visited the Peruvian sierra in 1932:

"On the road we met an old Indian, walking along with his daughter, a girl of some twenty years. She wore a hat covered with yellow flowers picked from the roadside and seemed like a shepherdess from the Middle Ages. We asked them the name of the town they came from, and they replied, 'We belong to Don Guillermo Pacheco.' ...This gentlemen, owner of people, is the hacendado of Llaceria; His serfs, it appears, know to whom they belong but not where they live."\(^2\)

One presumes that controls over labor mobility have become internalized in people who know to whom they belong.

Mexican history runs along the same path as Peru's, with only a few deviations. The great haciendas that came to dominate the Mexican countryside by the seventeenth century sprang from a variety of sources, but not directly from encomiendas.\(^3\) Cattle raising took on greater importance in the first century of Spanish settlement, and so more frequently in Mexico the hacienda grew out of earlier estancias, which involved grants of grazing rights. Estancias gave usufruct but not land title, however; as in Peru, it remained for grantees to obtain undisputed land title through subsequent purchases of title confirmation (composiciones de tierra). Opportunities for title purchase arose as early as 1571 and extended into the eighteenth century, thus permitting various usurpations to become legitimized.\(^4\)

\(^1\) Favre 1964, p. 253.

\(^2\) Saenz 1933, p. 172.

\(^3\) Zavaa 1943, pp. 80-83. McBride 1923, pp. 44-53.

Land titles without a labor force were equally useless in Mexico. As in Peru, this caused some of the earliest recipients of mercedes to fail as agriculturalists. When an edict of 1549 denied encomenderos the use of personal labor services, restricting their gain to tribute collection, a labor supply crisis threatened. In their desire to avoid the abuses of coercive labor levies, crown authorities confronted the crisis by attempting development of a free wage system. Unfortunately, the wisdom behind Domar's maxim frustrated their efforts. They found that Indians would not work for the wages offered, and so instead they returned to forced labor, but on the regularized and less arbitrary basis of the cuatequil. Being administered by Crown authorities rather than encomenderos, the cuatequil brought better conditions to Indian laborers. Compulsory service was required for only three weeks per year, and attempts were made to give conscripted Indians choice of work location. Efforts at amelioration were often frustrated in local administrators, however, and Crown authorities persisted in their preference for free wage labor. At last, in 1632, the cuatequil was banned from the agricultural sector.

If the cuatequil never attracted great support from Crown authorities, neither did it from hacendados. As in Peru with the mita, hacendados found periodically delivered forced labor unreliable when compared to the alternative of a captive permanent labor force. They had achieved sufficient success in creating such a labor force that the loss of cuatequil labor after 1632 imposed no great hardship. Their techniques were the

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1Chevalier 1962, pp. 54-58.

familiar ones of money advances, sometimes associated with encroachment on the lands of Indian communities to produce a judicious combination of carrot and stick. In the end, the labor force thus acquired became bound into debt peonage. The process of increasing indebtedness is described thus by Zavala:

"By careful study of account books on certain haciendas in the eighteenth century, one can see that the wage and debit entries are generally maintained in tolerable balance as long as no event of importance occurs in the ganado's life. But the moment there occurs a baptism, a marriage, a funeral, or a fiesta, there is entered a substantial deficit that becomes difficult to counterbalance later and thus entered repeatedly in later accounts." Having successfully defended the Indian population from excessive exactions under the cuatequil, Crown authorities continued their protective role in the face of an expanding system of debt peonage. Judicial records document numerous instances of Indians who successfully sought redress through local courts. Furthermore, the Crown resisted the perpetuation of indebtedness by limiting the size of debt that could legally be incurred. As so often occurred in Spanish colonial history, however, good intentions were subverted by fiscal need. Debts incurred through tribute payments made by the hacendado were not included within the indebtedness ceiling, which therefore proved quite ineffective. When control of runaways was tightened

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2 Zavala 1944, p. 744.
3 Zavala 1944, pp. 730-735.
4 Zavala 1944, pp. 731-733.
by anti-vagrancy laws and the introduction of labor pass books (boletas de libertad) in the eighteenth century, the circle was as closed for the Mexican ganan as for the Peruvian yanacona.\(^1\) Compared to Peruvian experience, then, the Mexican history of colonial labor control gave evidence of more active concern for Indian welfare by Crown authorities and less use of forced labor, but also earlier use of debt peonage.\(^2\)

With the coming of Bourbon rule in the last half of the eighteenth century, Crown policy shifted emphasis from Indian protection to the use of Indians for economic expansion.\(^3\) This new tendency remained strong in government policy through the nineteenth century, as a large portion of the Indigena labor force remained controlled in a system of debt peonage that only grew more exacting when new economic opportunities were developed during the Porfiriato. In extreme circumstances, like the henequen plantations of Yucatan and the tobacco farms of the Valle Nacional, the system became corrupted into a deadly slave trade, in which the laborers were treated perhaps worse than slaves, since no purchase price had been paid and landowners therefore had no interest even in protecting a capital investment.\(^4\)

The continuance of debt peonage, even with such excess, was possible because the government fully supported the system, using its rural police to catch runaways and generally keep order, and because in the isolation of

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\(^1\)Zavala 1944, pp. 741-742.

\(^2\)One suspects the difference to lie with historians as well as history.

\(^3\)Zavala 1944, p. 739.

\(^4\)The original expose is still worth reading. Turner 1910.
rural Mexico workers held little idea of where they might escape to anyway. "Mexico is predominantly a country of the mule path,"

Tannenbaum wrote as late as 1926, "mountainous, and with a rainy season lasting in some parts of Mexico for the whole summer, practically isolating the community, cutting it off in many places from postal and even telegraph communication. Rural Mexico is a country without books, newspapers, or magazines, without teachers or doctors -- an inaccessible, cut-off little world, set apart from the rest, and upon occasions still using barter."¹

Breaking that rural isolation required a revolution, and an agrarian reform of Cardenas. Only after the 1930's may we consider that four centuries of control over the rural labor force had come to an end.

In West Indian history, control of labor supply was so explicit and obvious in the form of chattel slavery that further elaboration seems unnecessary. However, the ironies of emancipation bear noting. Historians have noted that, far from fighting bitterly against a potential loss of labor force, planter-controlled West Indian legislatures moved toward emancipation more rapidly than required by the pressures of the English parliament. Such apparently strange behavior becomes quickly understood by remembering that planters held total control of land on many islands. With wages fixed by mutual agreement, newly freed slaves had no alternative but to continue work as before, for the same master and at the same subsistence level.² Explicit control mechanisms over a labor force become unnecessary if there is no place else to go.

¹Tannenbaum 1929, pp. 84-86.
²Guerra y Sanchez 1964, pp. 23-25.
The neat control of collusive landowners on small islands contrasts with the situation in the U.S. South after the Civil War, where increased labor mobility represented an economic threat to landowners. Former slaves were able to migrate to regions of high labor productivity, forcing landlords in other areas to counter with wage increases.¹ In this situation, landlords frequently held onto their laborers by creating a form of debt peonage, through which tenant farmers were immobilized by continuing indebtedness to the local moneylender-cum-merchant.² Indebtedness dampened but didn’t not eliminate labor mobility. Slaveowners followed correct economic instinct in their bitter opposition to Emancipation.

Our emphasis on labor control is merited by the importance this problem held for the landowning class. In Macera’s words, “In no case better than that of Peru could the mercantilists have been able to say that population is wealth. Land abounded and was worth relatively little in coast as well as sierra. All writers of the colonial period agree on this point.”³ As population expanded over the centuries, land also acquired some scarcity value, but even in recent years its relative abundance was manifest in the extensive farming methods used by the hacienda, compared to the intensity of cultivation on minifundios. The Colombian contrast of grazing in valleys and farming on hillsides is often considered a classic example of this cultivation pattern, thanks to the publicity given the case in the 1950 World Bank Report. The pattern was viewed as irrational by World Bank economists, but from the standpoint of Colombian hacendados

¹Ried 1972, pp. 4, 16.
²Ransom and Sutch 1972a.
³Macera 1971, page 16.
the system made good economic sense. The horizontal H curve of the
model is an exaggeration, but an approximation of reality.

Regarding wages paid by the hacienda, occasional data can be found
scattered through historical and anthropological sources, but generally in
a form unsuited for throwing light on the workings of the model presented
in this paper. A few examples will illustrate both data and difficulties.

The Peruvian Yanacunas assigned to an hacienda by colonial authorities
was obliged to work a stipulated period of time with no compensation other
than the right to cultivate a minifundio plot. However, some wage-equivalent
pre requisites were associated with his status. The hacendado, for example,
made tribute payments in his name, and in many cases also regularly extended
gifts of animals or maize. The situation is less clear in the case of day
laborers drawn into debt peonage. At first, of course, they had to be paid a
wage
/in order to be recruited, although the customary use of payment in kind has
made calculation of wage level difficult for both the day laborer and the
historian. As the laborer was drawn more firmly into debt peonage, however,
wage payments increasingly became arbitrary accounting entrees balanced
against arbitrarily valued purchases from the hacienda store, a double system
of transfer prices divorced from the reality of market transactions. Finally,
as laborers became tied to the hacienda by the force of tradition more than the
juggling of accounts books, the fiction of wage payment could be dropped
entirely. To my knowledge the details of this process have not been traced
out empirically by Peruvian historians.

1International Bank for Reconstruction and Development, 1959, pp. 61-64, 383-
384. The case is also discussed in Hirschman 1963, pp. 117-121. Also

2Macera 1971, pp. 27. Also Vasquez, 1961, pp. 13.

In Mexico, the account book juggling of debt peonage, begun in Colonial times, was continued until the 1910 Revolution, so positive wages continued to be paid. To the extent that a given hacienda was drawing new laborers into debt peonage at the same time that others had been firmly locked into the system, recorded wages would have maintained an economic meaning. In earlier periods they were at times subject to control by Crown authorities as part of the general concern for Indian welfare.¹

Recent anthropological studies in Peru have pointed to numerous examples in which the original status condition of Yanaconas has been continued, including unremunerated labor requirements.² At the same time haciendas continued to hire day laborers among neighboring workers not formerly bound to the hacienda, and such wages have been recorded by many researchers.³ The difficulty with these various statistics lies in the absence of information about the extent of labor control in each particular instance. Haciendas in some regions may be unable to exercise market control over day laborers, thus being obliged to pay a competitive wage. In other regions, haciendas may exert control of the kind described in the model of this paper. The resulting wage rates would be expected to be quite different. Wage data therefore requires complementary data on the extent of labor market control exercised by hacendados. The model in this paper might point out the

need for such data, and serve to encourage its collection.

The hacienda's maximizing process supposes a capability of readjusting minifundio size as the profitability of hacienda operations changes with shifts in the H curve. Difficulties arise, of course, when this curve rises, since in this case the hacienda finds it profitable to contract the size of associated minifundios. Encroachment upon minifundios is often difficult to accomplish, however, since campesinos may have been permitted an income somewhat above subsistence, such that adjustment involves a reduction in their real income. The hacienda is confronted with its greatest adjustment difficulties in cases where it desires independently owned minifundios to contract. The contraction has often involved a reduction in real income of campesinos, and has been resisted vigorously. Nevertheless, in many historical instances the hacienda has possessed sufficient power to carry through this painful and often violent process.

Not all instances of hacienda encroachment upon the lands of indigenous communities fit neatly into our model. In many cases encroachment has been undertaken for the land itself. That is, the marginal product of land was positive, it was not a free good. This often was the case in cattle raising regions, where the production process required few laborers but much land. In other instances, however, encroachment upon indigenous communities has been undertaken as a means of squeezing the labor force, reducing its income from minifundio production and driving it to the service of the hacienda.
Mexican history provides numerous instances of both these cases. The predominance of cattle raising made the haciendas' demand for land at times insatiable. Colonial records abound with instances of land being absorbed into haciendas for having been untilled, or having belonged to deceased Indians. In other cases, the Indians were very much alive and engaged in tillage; the very loss of land served as incentive to direct the gañan down the path leading to day laborer and eventual debt peon. The process worked not only against indigenous communities but also against Spanish settlements, whose members were absorbed into the haciendas as cowboys, stewards, and overseers.¹

The process of encroachment continued in spurts throughout colonial and republican periods, intensifying whenever hacienda operations increased in profitability or technical change raised the marginal product of land and encouraged enclosure and expulsion. Under the Porfiriato various laws facilitated encroachment against both public lands and indigenous communities in intensified form. In Mexico, as elsewhere, the most notorious instances come from the history of sugar. Morelos, the region that nurtured the revolutionary movement of Emiliano Zapata, witnessed the process in classic form:

"Since the sixteenth century, sugar plantations had dominated life there; in 1910 it was an old story that they crowded villages and independent farms, that hacienda lawyers finagled lands, timber, and water from weaker but rightful

¹Chevalier 1963, Chapter 6, esp. pp. 215, 222.
users, ... Dispossessed and destitute, many villagers started share-cropping the scruffiest of the plantation fields. Then, as their debts mounted, they hired themselves out as field hands, still living in their villages but working in contracted gangs. ...Living in terms of money, they fell deeply in debt. Finally they left the village for good and like many ex-rancheros moved their families onto the plantations as gente de casa, permanent resident laborers... Thus, besides land, the planters acquired a dependent labor force... Between 1905 and 1908 they raised their production over 50%. And they maneuvered for still more land, more water, and more resident laborers. In this development, this planters' progress, the village as a community had no place. The imminent utopia was a plantation.¹

An expanding sugar industry inflicted a similar history on certain villages along Peru's northern coast. As late as 1900, travellers described villages in the Chicama valley as bustling, prosperous and alive. Twenty years later, others saw them in ruin. In the interval, they had lost lands to the expanding sugar estates, but only after having lost precious water rights, essential in a valley that blooms and survives entirely by irrigation. The instrument of usurpation was the administrative apparatus of water allocation, under continuing control of the major landowners despite reform efforts embodied in the Código de Aguas of 1902. Previously more or less satisfied with water allocations, the large estates came to

¹Homack 1969, pp. 41, 46-50.
feel increasingly water-starved in the closing years of the nineteenth century, when economic incentives induced them to specialize in sugar cane. Compared to other crops, sugar cane required about three times as much water per hectare. A previously free good had been made scarce through technological change. The large estates set about capturing the factor, and the villages were destroyed in short order.¹

In many areas of Mexico and Peru centuries of encroachment produced indigenous villages with crippled local economies. In Tannenbaum's broad-brush description of the Mexican countryside on the eve of revolution:

"The villagers tend to be confined within the boundaries of the haciendas and therefore to be dominated by them....in some of the villages the inhabitants could not keep as ass or a goat because the gates of the haciendas close to the streets....either the villages have no lands or insufficient lands, or they have the poorest lands....broadly speaking, the free rural villages have to depend on the hacienda for access to tillable soil for their means of existence. ...The free village exists but its economic life is dominated by the haciendas."²

¹Klaren 1970, pp. 74-86. This may be considered a variant of the model in which water rather than labor is measured on the horizontal axis. The necessity of maintaining subsistence-level payments to the scarce factor is removed, however, so maximum profits are earned by driving out the minifundios and devoting all water to plantation production. For a seventeenth century example of sugar destroying a small proprietor economy, see the case of Barbados, summarized by Guerra y Sanchez 1964, pp. 10-17.

²Tannenbaum 1929, pp. 61-63.
In some cases, the freedom of the villages was destroyed entirely. Thus, in one Peruvian case observed in 1932: "Aanco is a little town on the road between Huaraz and Ayacucho, inhabited by the serfs of two haciendas whose boundaries meet in the town, going down the middle of a street."\(^1\) Another town in Huancavelica, newly founded in a resettlement scheme organized by local hacendados, was laid out so as to avoid future encroachment problems: Lands set aside as the town's own were insufficient for sustenance, and beyond those lands, in every direction, lay the lands of various haciendas.\(^2\)

While Mexican encroachment was halted by the Revolution, the process has continued at places in Peru until recent years. In the 1940's the village of Tarmatambo (Junin) was razed and its leaders jailed for having dared to resist the encroachments of a neighboring hacienda.\(^3\) Vasquez has recorded numerous instances of encroachments attempted, resisted, and publicized in Lima's newspapers during the 1950's and early 1960's.\(^4\) By the mid-1960's, however, the political tide had turned. Indigenous communities, organized into peasant syndicates, were reoccupying lands taken previously by haciendas. The hacendado's political support was in disarray, his power of local control was gone, and the Peruvian sierra had entered the early stages of the Age of Agrarian Reform.\(^5\)

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1Saenz 1933, p. 171.
2Favre 1964, p. 255.
3Tullis 1970, pp. 120-122.
4Vasquez 1961, pp. 33-34, 43-45.
5Cotler and Portocarrero 1969, Quijano 1965.
Other historical examples may be cited of haciendas in decay, suffering, in terms of the model, a downward shift of the H curve. In most recorded cases, however, the downward shift proved so precipitate that the hacienda's very survival was placed in doubt. Favre gives a Peruvian example of this sort in the Huancavelica region. In the general economic collapse that followed independence, he observes, haciendas disintegrated. Having lost their markets through the closing of local mines, hacendados found themselves forced to sell off lands, the purchasers being drawn from a new class of local merchants and bureaucrats who presumably demanded land to produce food for home consumption.\(^1\) In terms of the model, the collapse of local mining drove the H curve down to zero.

Other cases of decay do not fit the model so well. In the decaying plantations of the Old South after the U.S. Civil War, the source of economic difficulty may be found partly in a downward shift of the H curve, since such plantations had been exporters of both cotton and young slaves. With Emancipation the sale of one product therefore became illegal.\(^2\) Beyond this, however, Emancipation also caused plantations to decay through loss of control over their labor force. In response to these setbacks, plantations were converted not into haciendas but into sharecroppers' plots.

How might this be explained? There appears no evident productivity difference between haciendas and share tenancy. However, each system retained one particular advantage, sharecropping conserved on managerial effort by the landowner. Periodic casual inspection and good advice (combined with the threat of expulsion) sufficed. When the time arrived for

\(^1\) Favre 1964, p. 241.

\(^2\) Conrad and Meyer 1964, pp. 69-73, 78-80.
distributing shares, the landowner held little fear of being deceived when
the crop could be sold only in a few places and could not be eaten.

By contrast, the hacienda demanded greater managerial effort from
the hacendado or his agent, but it held the advantage of keeping workers
isolated from outside commercial contacts, thus helping perpetuate
monopsonistic gains from total control over the labor supply. In the post-
bellum U.S. South, however, control over labor had already been lost.
Former slaves held enough freedom of choice to reject work gang employment,
because of its association with slave status and perhaps also because
racist perceptions of Black labor productivity caused wage offers to be
particularly low. In this situation the hacienda system would have been
unworkable, while sharecropping was acceptable to the labor force and a
conserver of managerial effort.\footnote{Note, however, that a twentieth century variant of sharecropping, known as
quasi-share labor carried something of the flavor of the hacienda. In
Taylor's description: "The quasi-share laborer receives remuneration in
two ways: wages for day labor for the landlord, and in addition either a
share of the crop on a small patch, or else the full crop on a patch one-
half the size. The size of the crop is insufficient to provide a full
living, so the cropper is ready to do additional wage work for the planter
at any time... Sometimes laborers participating in such an arrangement
are expected to accept a fewer daily wage for work for the landlord than
wage laborers without such a crop interest." (Taylor 1954, p.144) Taylor
viewed quasi-share labor as a transitional system associated with early
stages of mechanization, in which landowners wished to hold a small permanent
labor force and rely on day laborers for harvesting. During this transition,
particularly in the 1920's, tenants displaced by early mechanization de-
pressed local labor markets. In other words, for a brief period the remain-
ing labor force became particularly immobile, thus creating the necessary
conditions for the rise of a hacienda system.}

\footnote{Reid 1972, pp. 4, 17. Ransom and Sutch 1972b, p. 11.}
IV. Some Variations on the Model

1. Shift in Hacienda Marginal Product Curve: The Case of Canadabamba

For many years Canadabamba, a highland hacienda of Peru's northern Sierra (Department of La Libertad), lay isolated from outside markets, leased to the owners of a small local mine.¹ The campesinos of the hacienda were assigned ample fields, in return for which they were required to provide various labor services for a trivially small wage: periodic labor in the mine, labor in the hacienda's fields that provided food for the mine's labor force and care and pasturage of the mine's mules. These exactions, however, were not onerous: "The company had no special interest in exploiting the hacienda intensively since their limited needs were easily provided for by the abundant reserves of the tenants."² The mine owners made no effort to find outside markets for additional produce, but the campesinos did market limited quantities of their own produce, some earning additional income as merchants handling the trickle of money flows in a basically barter economy.

Then, in the 1930's, the mine closed down, and Canadabamba was sold to a coastal sugar estate. The new administrators arrived with new visions of marketing possibilities and radically different ideas about hacienda management. They saw the hacienda as supplier of labor to the sugar estate and as supplier of meat and dairy products to an increasingly accessible national urban market. Their reorganization consisted of razing the campesinos' village, which had occupied fertile bottomland, and reassigning campesinos to smaller plots at higher elevations, each size of plot being carefully adjusted to size of family. Access to common pasturage was denied, so campesinos were

¹This case is described in Miller 1967, esp. pp. 147-152, 169-183.
forced to sell off their herds. Outside commercial sales by campesinos were eliminated, since they no longer produced a food surplus. Minifundios were so reduced in size that they generally failed to provide subsistence, so campesinos were obliged to work for wages over and above the labor time required by their traditional servile status. Wages were so low that the unskilled worker cannot subsist on them alone.\(^1\)

Such drastic change was not accomplished without resistance. Two campesinos were killed in the violent reaction provoked by the destruction of the village, but most quickly realized that they had no alternatives, and the new regime became firmly established. In the restored tranquility, however, the new supply of wage laborers was perhaps far less than the owners had hoped for. Campesinos were reported to consider unskilled wage labor a humiliation, a public admission of failure to make ends meet and therefore something to be avoided at all costs. In 1957, the 194 families of Canadabamba provided an average of only 12 casual laborers each day.\(^2\) Beyond this, however, many adolescents worked regularly as shepherds, messengers, and apprentices, while other adults occupied respected positions as masons, carpenters and truck drivers.

The sad experience of Canadabamba may be explained as a variant to the basic model that is shown in Figure 5. During the regime of the mining company, the H curve sloped downward, since hacienda output was shipped to the outside world as ore, an output produced by combining labor (either directly applied or incorporated in food) with another factor in fixed supply:

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\(^1\) Ibid, p. 174.

\(^2\) Ibid, p. 176.
the ore body. Given an H curve in the shape of HH', and a nominal and
traditional wage O'Neill, the mine owners required DO' of labor time, leaving
remaining time and land available to the campesinos. The marginal product
curve on combined minifundios was therefore AB, and campesinos earned OACD
on their own plots plus DNN'O' from the nominal wage paid for work in the
mines or in the hacienda's fields. Total campesino income was permitted to
be greater than subsistence, because the downward sloping H curve put a limit
on the hacienda's exactions. Squeezing more labor from the campesinos
could not add to the hacienda's profits, when the marginal product of labor
had already been driven essentially to zero, i.e., since the nominal wage
O'O' is trivially small, so is the distance DH.

When Canadabamba fell into the hands of the sugar estate, however,
the market for hacienda output became virtually limitless. The downward
sloping H curve became horizontal, as it was in earlier diagrams. Then it
became profitable to squeeze the campesinos back to subsistence, and that
is what happened.

2. Shift in the Minifundio Marginal Product Curve: The Case of
La Convencion.

La Convencion is a remote valley in southern Peru (Department of
Cuzco), lying in the lower reaches of a river system that cuts its way from
rugged highlands down to the vastness of the Amazonian jungle. From early
times the valley's lands have been divided among haciendas that planted the
fertile bottomlands with cacao, sugar, tea, coca, and coffee. Hacienda land
titles covered hillsides as well; these lands were offered to highland
campesinos as inducement to migrate to La Convencion and become hacienda

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1 This case is described in Craig 1969, esp. pp. 276-284, and in Hobsbawm
laborers. For use of these hillside minifundios, campesinos assumed the obligation to contribute about 10-14 days per month of free labor on the hacienda's fields.

For the haciendas, poor transport connections with the outside world posed a chronic problem that was overcome only in the early 1930's, when a combination of rail and road links succeeded in penetrating the upstream canyons. The transport problem thus finally solved, economic expansion remained obstructed by a series of malaria epidemics that sent laborers fleeing from the valley. Only after malaria had been effectively controlled in the late 1940's were hacendados able to attract substantial numbers of campesinos back to the valley. Once again they farmed hillside plots, inferior land from the standpoint of the valley's traditional crops, and with both transport and labor supply problems resolved the valley seemed ready for expanded production.

That was precisely what happened, but the key crop of expansion turned out to be coffee, which grows best on hillsides. Suddenly the campesinos' hillside plots became the superior land. Coffee production doubled between 1950 and 1954, then tripled between 1954 and 1960, most of this increase coming directly from campesino plots and not from the haciendas. Campesinos prospered as they sold coffee through new marketing channels that by-passed the haciendas. Plots that had formerly seemed barely sufficient for subsistence were now more than the campesino could handle, such is the labor-intensive nature of coffee growing. The obligatory labor services required by the hacienda now appeared increasingly onerous to campesinos faced with their own labor shortage. These campesino tenants (arránderes) thereupon began subleasing part of their plots, the subtenants (allegados) agreeing
to provide required labor services to the hacienda. As coffee prices continued rising, the process repeated itself as subtenants leased to sub-subtenants (suballegados).

The hacendados of La Convencion were not long in realizing that the old plot sizes required to attract arrendieres before the coffee boom had become larger than necessary for attracting new laborers. The arrendieres were earning substantial rents from lands for which the haciendas held legal title. The hacendados attempted to reduce this rent and increase their own profits by increasing obligatory labor services and by reclaiming plots previously allocated to campesinos.

Thus the hacendados attempted to squeeze the campesinos when new profit opportunities had arisen, just as in the case of Sanadabamba. But there existed a key difference between the cases: The campesinos of La Convencion had acquired substantially more experience with the outside world, partly because of growing and selling coffee, partly because it was 1956 and not 1936. Faced with a threat from the hacendados, arrendieres and allegados joined in common cause, formed a syndicate of campesinos and developed connections with the urban trade union movement. After focusing most of their efforts on legal appeal in the 1950’s, the campesinos of La Convencion organized a major strike in 1960, then collectively renounced labor obligations to the haciendas in 1962. Also in 1962, part of the syndicate turned to the revolutionary leadership of Hugo Blanco, a university-trained Trotskyist who had come to the valley as an allegado. In such an environment of violence and tension, the national government refused to support hacendado claims. Agrarian reform was first implemented in La Convencion, and the haciendas, to the extent that they survived as entities,
utterly lost control of their labor force.

The experience of La Convencion illustrates a process of technical change in the hacienda when that change primarily affects the minifundio. In Figure 6, this is represented by an outward shift in the minifundio's marginal product curve, from AB to CD.\(^1\) Assuming that arrendires are required to provide EO' of labor services to the hacienda, then the coffee boom increases arrendire income from OEFA to OEGC. It also increases the cost to the arrendire of required labor service on the hacienda, when this cost is measured in income foregone. Formerly EO'BF, this cost increases to EO'DG. The cost may be reduced, however, by the availability of allegados. Assume an infinitely elastic supply curve of labor, such that allegados may be attracted to La Convencion at the same wage that attracted arrendires in the days before the coffee boom. In the simplest case, suppose that arrendires hire an equal number of allegados. Then total income of these allegados will also equal OEFA, but combined income of arrendires and allegados will be OKLC, where arrendires put in labor time of CO' on coffee and allegados contribute O'K. By subcontracting with allegados, the arrendires have gained income of EKLC at a cost of OEFA.

In fact, arrendires might improve their position even more by subcontracting with a greater number of allegados, obtaining from each allegado less labor time for delivery to the hacienda, but giving up less land for the allegado's own use. These complications in the arrendire's maximizing process are discussed algebraically in the Appendix.

\(^1\) For simplicity we assume the hacienda marginal product curve to be unchanged, although in fact coffee provided additional income-earning opportunities for haciendas as well. We also assume away the additional complication of suballegados.
The hacienda's interest is evident. From its viewpoint, the arrandire has become a parasitic middleman, earning much and giving no labor in return. The hacienda's interest lies in capturing the arrandire's income, by-passing this middleman. Essentially this is what the haciendas of La Convencion tried to do, but they couldn't do it.

V. Conclusion

Latin America holds no exclusive rights to the mechanisms discussed in this paper. Similar tenurial arrangements have been identified in numerous parts of the world. In a few cases, economists have concerned themselves with the economic factors underlying the rise, decay, or mere existence of specific institutional arrangements. North and Thomas, for example, have pondered the origin and trajectory of labor service obligations under feudalism, placing great importance on the desire to minimize costs of supervising economic transactions as the key explanatory factor.¹ Domar's maxim derived from his reading of the experience of Russian peasants in the seventeenth century.² The social historian Horner has described hacienda-type institutions in Scandinavia, Germany, Egypt, and South Africa.³ A similar system has characterized Soviet collective farms, where peasants have produced high yields on small plots granted for their own use, thereby earning enough to permit the payment of low wages for time spent on collective fields.⁴

¹North and Thomas 1971
²Domar 1970
³Horner 1970
⁴The theoretical literature on collective farms has focused on problems in the theory of labor-managed enterprise. For an explicit consideration of the role of private plots, see Oi and Clayton 1968.
The best known historical study addressed to the concerns of this paper must surely be Marx' analysis of primitive accumulation, the process whereby lords converted landholding from a feudal fiduciary trust into private property and then proceeded to expel peasants from the land in a series of enclosure movements. This expropriation of the workers' own means of production created the urban proletariat of the Industrial Revolution, supplying workers willing to accept low wages for lack of any viable alternative. ¹ A similar process has been continued in very recent African history.

The Kikuyus of Kenya, for example, were pushed off highland areas into reservations containing land insufficient to sustain their numbers, and so they returned to what had become the White Highlands, providing a labor supply that remained cheap and reliable until the tensions of the system exploded in the Mau Mau rebellion.

All these various cases illustrate techniques of controlling labor supply, often through creating and enforcing a scarcity of land. The exercise of such control has characterized numerous unhappy chapters in the history of the human condition.

1. The maximization process under share tenancy and hacienda systems.

The maximization process of the landowner in a system of share tenancy has been analyzed by a number of authors.¹ A solution is explained diagrammatically in Figure 7. Suppose the owner's land holdings are fixed in such size that, when labor is applied, the marginal product curve $AB$ results. The going rural wage is $CW$. The terms of share tenancy offered by the owner must enable sharecroppers to earn income as if they were being paid the going wage. If we follow the Cheung assumptions that sharecroppers contract with only one owner and do not perform additional wage labor, then tenants are faced with a take-it-or-leave-it situation without possibility of marginal adjustment. Under these terms, the owner's profit is maximized if he secures a total labor input of $OL$. Total sharecropper income will equal $OLBW$, leaving owner profit of $ABW$.

To secure this result, the owner offers not a wage, but a plot of given size and a share agreement. He adjusts plot size until labor input becomes equal to $OL$. Then he proposes a share of output, $DA/OA$, such that all sharecroppers on his land together will receive $ABCD$ ($DA/OA = CB/LE$). But, if the landlord has done his calculations correctly, $ABCD = OLBW$, and profit $ODCL = ABW$.

Put more briefly, the landlord maximizes profit by manipulating:

(1) plot size (i.e., labor input), and (2) rental share, subject to the constraint of the rural wage. In symbols, his maximizing process is expressed as:

$$\text{Max } \pi = (1-s)f(L)$$

Subject to: $wL = sf(L)$,

¹A review of the literature and solution to the problem are found in Cheung 1969. 3ardhan and Srinivasan 1971 have provided a more general solution allowing the possibility that the tenant would rent land from several landlords and also work part time as a wage laborer.
where \( \pi = \text{profit}, s = \text{tenant's rental share}, f = \text{linear homogeneous production function for a fixed quantity of land}, w = \text{going rural wage}, \) and \( L = \text{total labor input}.^2 

The landlord's maximization process in the hacienda model of this paper is virtually identical. The hacendado maximizes profits by manipulating:

1. minifundio plot size, and
2. hacienda wage, subject to the constraint that campesino income must equal subsistence. In mathematical terms,

\[
\text{Max } \pi = (H-w)(\bar{L}-L_m)
\]

Subject to: 

1. \( Q_m = f(L_m, D_m) \)
2. \( f_L = w \)
3. \( Q_m + w(\bar{L} - L_m) = \bar{S}, \)

where \( w = \text{hacienda wage}, \bar{L} = \text{total labor supply, fixed in quantity}, Q_m, L_m, \) and \( D_m \) are output, labor, and land of minifundios, \( f = \text{minifundio production} \)

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\(^2\)First order conditions of the solution are set out in Cheung 1969, pp. 20-21.
function, \( f_L = \text{marginal product of labor} \), and \( \bar{S} = \text{subsistence income} \). Constraints (1) and (2) may be substituted in (3) to provide a single constraint:

\[
(4) \quad f(L_m, D_m) + f_L(L_L_m, L - L_m) = \bar{S}
\]

The solution to this maximization problem could present difficulties, however. First, if the minifundio marginal product curve were allowed to become negative over certain values of \( L \), then quite possibly the profits rectangle would be maximized when minifundio marginal product and hacienda wage were negative. Non-negativity conditions are needed to avoid such a nonsense result. Equations (3) and (4) are also more sensibly expressed as inequalities: Campesino income cannot be less than but may be greater than subsistence. Unfortunately, these inequalities convert the solution into a cumbersome problem in nonlinear programming.

2. A simplified solution with Cobb-Douglas production function

Some computational difficulties may be avoided by judicious use of a minifundio production function that is assumed to be of Cobb-Douglas form. The negativity problem regarding hacienda wages is immediately eliminated, since the marginal product curve of a Cobb-Douglas function is convex from below, asymptotic to the horizontal axis and therefore never negative. The function also holds the considerable virtue of being relatively simple to work with.

Suppose then that the constraints to the maximization problem may be written:

\[
(1a) \quad Q_m = L_m^\alpha D_m^{1-\alpha}
\]

\[
(2a) \quad f_L = w = aD_m^{1-\alpha} L_m^\alpha
\]

\[
(4a) \quad L_m^\alpha D_m^{1-\alpha} + aD_m^{1-\alpha} L_m^\alpha (L_m - L) = \bar{S}
\]
We may skip over a derivation of the first-order conditions -- what
must be equal to what at the margin in order for profits to be maximized,
since the shape of the function relating total hacienda profit to the labor
and land devoted to minifundio plots holds greater interest. That is, we
wish to express \( \pi \) as a function of \( D_m \) or \( L_m \). We begin by relating profits
to minifundio labor force \( (L_m) \), since this represents a slightly easier task.

First, units of measurement for labor force and agricultural output
and income are chosen such that both \( \bar{S} \) and \( \bar{L} \) equal unity. \( L_m \), therefore,
gives the per cent of total labor force devoted to minifundio production.
Then, rearranging equation (4a) as an explicit function of \( D_m \), we get:

\[
\frac{D_m^{1-\alpha}}{L_m^\alpha + \alpha L_m^{\alpha-1} - \alpha L_m^\alpha} = \frac{1}{L_m^\alpha}
\]

and substituting (2a) and (5) into the profit function gives:

\[
\pi = \left( \lambda - \frac{\alpha}{L_m^\alpha + \alpha - \alpha L_m^\alpha} \right)(1-L_m).
\]

Equation (6) shows quickly the hacienda profit corresponding to extreme
values of \( L_m \). When \( L_m = 1 \), all labor is devoted to minifundio production
and profits are zero. When \( L_m = 0 \), \( \pi = \lambda - 1 \), so profits are positive if the
\( H \) curve lies above the subsistence wage. This represents the plantation case.

To find the shape of the profit curve for \( L_m \) values between 0 and 1,
we plug a few selected values of \( L_m \) into equation (6) and in addition we
look for profit maxima by setting the partial derivative equal to zero.

Rearranging terms after taking the derivative of (6), a quadratic equation
in \( L_m \) results:

\[
\frac{\partial \pi}{\partial L_m} = (1-\alpha) \frac{2}{H} L_m^2 + 2\alpha(1-\alpha)HL_m + (\alpha^2 H - \alpha) = 0.
\]
Since $L_m$ must be positive, only the positive root need be considered, i.e.,

$$L_m = \frac{-\alpha H + \alpha^{\frac{1}{2}} H^{\frac{1}{2}}}{(1-\alpha)H}$$

The resulting profit-maximizing values of $L_m$ are shown in Table 2, along with other arbitrarily chosen values between 0 and 1. The resulting curves are drawn in Figure 3, for the case where $\alpha = 0.5$.

Equations (2a) and (5) indicate that land allocated for minifundio use ($D_m$) and the hacienda wage ($w$) are uniquely determined for given $L_m$ and $\alpha$. Table 3 shows these land and wage values for the same $L_m$ and $\alpha$ values used in Table 2.

The shapes of all these curves more or less conform to expectations. Those of Figure 3 show quite clearly how the various optimizing outcomes depend on the height of the $H$ curve relative to the subsistence wage of unity. If $H > 2.0$, the hacienda becomes a plantation, with profit maximized at a corner solution where $L_m = 0$. If $0.5 < H < 2.0$, the hacienda earns a profit where the plantation could not. If $H < 0.5$, however, even a hacienda can earn no profit, and all labor would be devoted to minifundios. The hacienda would cease to exist. Within the hacienda range of $0.5 < H < 2.0$, the higher the $H$ curve the lower are $L_m$ and $D_m$ at the profit maximum. A rise in the $H$ curve provides incentive for minifundio size ($D_m$) to be squeezed, but hacienda wages must be raised. When $L_m$ and $D_m$ are squeezed down to zero, the hacienda has become a plantation and so must pay a full subsistence wage ($w = 1.0$). Whenever the hacienda continues to exist, however, it always pays less than a subsistence wage, the lower wage limit, curiously enough, being equal to the output elasticity of labor ($\alpha$) in the production function.
### Table 2

Values of $y$ for given $L_m$, $H$, and $\alpha$

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Profit maxima
- $0.264$ 0.338
- $0.414$ 0.172
- $0.632$ 0.050
- $1.0$ 0

Profit maxima
- $(1.896)$ $(0.101)$
- $(1.202)$ (0.254)
Table 3

Values of $D_m$ and $w$ for given $L_m$ and $\alpha$

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<td>0.811</td>
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<td>0.982</td>
<td>0.556</td>
<td>0.789</td>
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<td>0.9</td>
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<td>0.996</td>
<td>0.526</td>
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<tr>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.75</td>
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</tr>
</tbody>
</table>

Profit maxima

| 0.264 | 0.661 | 0.791 |
| 0.414 | 0.829 | 0.704 |
| 0.632 | 0.949 | 0.613 |
| 0.099 | 0.275 | 0.968 |
| 0.464 | 0.825 | 0.866 |
Some of these relationships are illustrated further in Figure 9. For a given $L_m$ of, say, 0.5, equation (5) indicates the minimum $D_m$ that will give campesinos a subsistence income. Suppose that this amount of land generates marginal product curve $AE$ in Figure 9, with hacienda profit $CDEH$. For this given $L_m$, any greater supply of land will raise campesino income above subsistence and will also reduce hacienda profit. No matter what the shape of the production function, hacienda profit is maximized at subsistence; at this profit maximum, values for $D_m$ and $w$ are determined independently of the hacienda marginal product curve $H$, as the calculations of Table 3 illustrated.

If a higher $L_m$ is chosen, say 0.6, then an unchanging $D_m$ would cause total campesino income to fall below subsistence by the amount $CDD'C'$. This cannot happen, so $D_m$ must be increased to restore the subsistence income level. The increase in $D_m$ cannot be so great as to restore hacienda wages to $0'C$, however, for then campesino income would exceed subsistence. Therefore, as shown in Table 3, when $L_m$ increases, $D_m$ must also increase and $w$ must fall.

We began this section of the appendix with a concern about constraints to the maximizing process that takes the form of inequalities. Have such problems been avoided? The possibility of negative values for minifundio marginal product and hacienda wage was avoided by the particular choice of
production function. The possibility of solutions involving \( L_m \) values of less than 0% or more than 100% was avoided simply by imposing corner solutions after inspecting the results for various combinations of \( H \) and \( \alpha \). The possibility of solutions involving a total campesino income greater than subsistence for a given quantity of minifundio land \( (D_m) \) has not yet been dealt with directly. In fact, the problem has been skirted by maximizing profits for given minifundio labor supply rather than land supply. The difference in these approaches is also illustrated in Figure 9.

In the case of \( L_m = 0.5 \), CDEH is the profit maximum for the given \( L_m \), but it need not be for the associated given \( D_m \). Profit may instead be maximized at \( C''D''H \), with campesino income above subsistence and \( L_m \) reduced to 0.4. This particular profit outcome does not appear in our curves relating \( \pi \) to \( L_m \), however, because for \( L_m = 0.4 \) profits would be maximized, i.e., greater than \( C''D''H \), at a lower level of \( D_m \).

Table 4 and Figure 10 relate profit directly to minifundio land supply for two cases: where campesino income is required always to remain at subsistence and where it is merely required not to fall below subsistence. For the latter case hacienda profit was calculated without a subsistence constraint, by substituting equation (2a) into the profit function, giving:

\[
(9) \quad \pi = \left( H-xD_m \right)^{1-\alpha} L_m^{\alpha-1} \left( 1-L_m \right)
\]

Then profit was maximized with respect to \( L_m \), for a given \( D_m \), by setting the partial derivative of \( L_m \) equal to zero. This gave:

\[
(10) \quad \alpha^2 D_m L_m^{1-\alpha} - \alpha L_m^2 - \alpha (1-\alpha) D_m^2 - \alpha L_m = 0
\]

Once equation (10) was solved for \( L_m \), the result was plugged into (9) to produce the unconstrained profit estimates of Table 4. These estimates are reproduced, however, only in cases where associated campesino income was
Table 4

\( \text{nd } (D_m) \text{ with and without Subsistence Constraint } \) (\( \alpha = 0.5 \))

<table>
<thead>
<tr>
<th></th>
<th>1.0</th>
<th>1.25</th>
<th>2.0</th>
</tr>
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<tr>
<td>( L_m )</td>
<td>( \pi )</td>
<td>( \pi )</td>
<td>( L_m )</td>
</tr>
<tr>
<td>*</td>
<td>*</td>
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<tr>
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<td>*</td>
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</tr>
<tr>
<td>*</td>
<td>*</td>
<td>0.333</td>
<td>*</td>
</tr>
<tr>
<td>*</td>
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<td>*</td>
<td>*</td>
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<tr>
<td>*</td>
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<td>0.414</td>
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<td>0.250</td>
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<td>0.152</td>
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<td>0.429</td>
</tr>
<tr>
<td>0.523</td>
<td>0.149</td>
<td>0.139</td>
<td>0.433</td>
</tr>
<tr>
<td>0.525</td>
<td>0.148</td>
<td>0.072</td>
<td>0.435</td>
</tr>
</tbody>
</table>

*denoted because \( S<1.0 \)
Figure 10

$H = 2.0$

$H = 1.25$

$H = 0.75$
greater than or equal to subsistence. In cases where income was less than subsistence, the subsistence constraint was binding and the constrained profit results relevant.

The figures of Table 4 show that, for a given $D_m$, it pays to pay more than subsistence when $D_m$ is large and when $H$ is large. When $D_m$ is large, squeezing the campesino to subsistence involves lowering the hacienda wage to such an extent that the hacienda's labor supply virtually dries up. When $H$ is large, labor is so valuable to the hacienda that it pays to offer a wage so high that income is pulled above subsistence.

In Figure 10, the solid curves relate profits to land size under the subsistence constraint, the dashed lines show the shift induced by switching to the unconstrained solution. It bears emphasizing that in every unconstrained solution that involves campesino income greater than subsistence there always exists the prospect of increasing profits still further by reducing land size $D_m$. Therefore the curve displacement introduced by the unconstrained solution can exist only where both curves are negatively sloped, never at the overall profit maximum.

3. The maximization process of arrendaires in La Convencion

The arrendaires (tenants) in the valley of La Convencion turned over part of their land to allegados (subtenants), in return for which the allegados agreed to assume the arrendaires' labor obligations to the hacendados of the valley. The arrendaires' time was thus freed for the more profitable activity of coffee cultivation. The maximization problem we wish to consider is: How would arrendaires best set the contractual terms of subtenancy so as to maximize their own incomes? These terms refer to size of plots and labor obligations associated with each plot.
To simplify the problem, we assume that arrendires wish allegados to furnish free labor services exactly equal to the arrendires' obligations to the hacienda — no more, no less. That is, arrendires wish to be totally relieved of this obligation themselves, and allegados would not be required to deliver additional free labor services to the arrendires. We examine the maximization process of a single arrendire. If we assume that all arrendire plots are of the same size, and that all arrendires offer the same terms to allegados, our results may be rescaled to reflect the maximization process in the whole valley.

In the notation that follows, capitalized subscripts refer to the arrendire, lower case to the allegados. The relationships to be considered are as follows:

(1) \( Q = f(D,L) \)

This is a coffee production function relating land (\( D \)) and labor (\( L \)) to output (\( Q \)). The function applies to arrendire and allegados alike, since coffee growing is the only agricultural activity of both tenant classes.

(2) \( D_A = D - \pi N_A \)

Land used for coffee growing by the arrendire equals total land controlled by the arrendire minus total land he has allocated to allegados, where that total equals allegado plot size times the number of allegado plots.

(3) \( L_H = nL_A = n(L_a - L_a) \)

The arrendire's fixed labor obligation to the hacienda equals the labor obligation extracted from each allegado times the number of allegados, being one allegado on each allegado plot. The allegado's labor service obligation in turn equals his fixed total labor time minus the time that can be devoted to his own coffee production.
(4) \( Q_A = f(D_a, L_a) = \bar{S} \)

The allagado's coffee income, which is also his total income, is fixed at the going local wage, which may or may not equal some concept of subsistence. This assumes an infinitely elastic, unlimited supply of labor at this going wage.

(5) \( L_A = \frac{\bar{L}_T}{n} \)

The arrondire devotes all his fixed total labor time to coffee production.

Operating within the constraints of equations (1)-(5), the arrondire wishes to maximize his coffee income \( Q_A \):

(6) \[
\begin{align*}
\max Q_A &= f(D_a, L_a) \\
&= f \left( \frac{\bar{D} - nD_a}{n}, \frac{\bar{L}_T}{n} \right)
\end{align*}
\]

Subject to the constraint obtained by substituting (3) into (4):

(7) \[
\begin{align*}
\frac{\bar{D}}{n} \left( \frac{\bar{L}_T}{n} - \frac{\bar{L}_H}{n} \right) - \bar{S} &= 0
\end{align*}
\]

The contractual terms that can be set by the arrondire involve plot size \( D_a \) and labor obligation \( L_H \). However, indirectly through selling the number of plots \( n \), since \( nL_H \) equals the constant \( \bar{L}_H \). Therefore, the arrondire's optimum is obtained by maximizing with respect to \( D_a \) and \( n \) the Lagrangian expression:

(8) \[
\begin{align*}
Q^*_A &= \left\{ \left( \frac{\bar{D} - nD_a}{n}, \frac{\bar{L}_T}{n} \right) + \lambda \left\{ \frac{D_a}{n} \left( \frac{\bar{L}_T}{n} - \frac{\bar{L}_H}{n} \right) - \bar{S} \right\} \right\}
\end{align*}
\]
(9) \[ \frac{\partial Q_A}{\partial D_A} = f_D^*_A (-n) + \lambda f_{D_a} = 0 \]

(10) \[ \frac{\partial Q_A}{\partial \alpha} = f_D^*_A (-D_A) + \lambda f_{L_a} \left( \frac{L_H}{n} \right) = 0 \]

(11) \[ \frac{\partial Q_A}{\partial \alpha} = f \left[ D_a, (\bar{L}_t - \frac{L_H}{n}) \right] - \bar{s} = 0 \]

Since from equation (2):

(12) \[ f_{D_a} = \frac{Q}{D_A} = \frac{3Q}{\partial D_a} \cdot \frac{dD_A}{dD_A} = f_{D_a} \left( -\frac{1}{n} \right) \]

Then, from (9), \( \alpha_l = 1 \). Substituting this plus (12) in (10) and rearranging gives:

(13) \[ n f_{D_a} D_a = f_{L_a} L_H \]

Put in words, this condition states that the value of land given up by the arrendiere \( D_a \) must equal the value of labor services acquired \( L_H \), when both values are established in terms of marginal productivity of the respective factors.

The nature of the arrendiere's optimum is brought out diagrammatically in Figure 11.\(^3\) Beginning with quadrant I, the relationship between \( n \) and \( L_a \) is a hyperbola from equation (3). The linear relation between \( L_h \) and \( L_a \) in quadrant II also comes from equation (3), i.e., \( L_h + L_a \) equals the constant \( \bar{L}_t \). Quadrant III shows the isoquant that equals the going wage \( \bar{s} \). Quadrant IV, which relates \( D_a \) to \( n D_a \), is derived from the other three quadrants. This is done most easily by beginning with integer values of \( n \) and following the curves around to corresponding values for \( D_a \) that are measured not only as

\(^3\) I am grateful to Lawrence White for suggesting the line of analysis contained in Figure 11.
horizontal distances on the $a$ axis but also equivalent vertical distances to the $45^\circ$ line. That vertical distance is then multiplied by the original $\frac{n}{2}$ value to produce the curve shown. The arrendiere's optimum lies at the trough of the quadrant IV curve, where $n_{a}$ is at a minimum.

Consider an incremental increase in $n$. By quadrant I,

\begin{equation}
\frac{\Delta L_{a}}{\Delta n} = \frac{\bar{L}_{H}}{\frac{n}{2}}
\end{equation}

By quadrant II, therefore

\begin{equation}
\frac{\Delta L_{a}}{\Delta n} = \frac{\Delta L_{a}}{\Delta L_{H}} \cdot \frac{\Delta L_{H}}{\Delta n} = (-1) \left( \frac{\bar{L}_{H}}{\frac{n}{2}} \right) = \frac{\bar{L}_{H}}{\frac{n}{2}}
\end{equation}

Moving along the isoquant in quadrant III gives

\begin{equation}
f_{L_{a}} \Delta L_{a} = f_{D_{a}} \left( \Delta D_{a} \right)
\end{equation}

Therefore:

\begin{equation}
\frac{\Delta D_{a}}{\Delta n} = \frac{f_{L_{a}}}{f_{D_{a}}} \frac{\Delta L_{a}}{\Delta n} = \frac{f_{L_{a}}}{f_{D_{a}}} \cdot \frac{\bar{L}_{H}}{\frac{n}{2}}
\end{equation}

Finally, since,

\begin{equation}
\frac{\Delta (nD_{a})}{\Delta n} = \Delta n + n \frac{\Delta D_{a}}{\Delta n}
\end{equation}

Then at the trough in quadrant IV:

\begin{equation}
\frac{\Delta (nD_{a})}{\Delta n} = \bar{D} = D_{a} - n \frac{f_{L_{a}}}{f_{D_{a}}} \cdot \frac{\bar{L}_{H}}{\frac{n}{2}}
\end{equation}

or:

\begin{equation}
f_{D_{a}} \Delta D_{a} = f_{L_{a}} \bar{L}_{H},
\end{equation}

which is the same as the maximizing condition of equation (13).
How many allegados will the arrendire wish to contract? To simplify the result, assume, without loss of generality, that

\[(21) \quad \bar{S} = 1.0\]
\[(22) \quad \bar{L}_t = 1.0\]
\[(23) \quad \bar{L}_H = \bar{K}_L\]

and with some loss of generality, assume:

\[(24) \quad Q_a = \frac{\alpha \cdot \bar{L}}{a} \]
\[(25) \quad \bar{L}_T = 1.0\]

Then, going around the quadrants again, we get:

\[(26) \quad n\bar{L}_h = K\]
\[(27) \quad L_a + L_h = 1.0\]
\[(28) \quad \frac{\alpha \cdot 1 - a}{a} = 1.0\]

Substituting (26) and (27) in (28) gives:

\[(29) \quad (1 - \frac{k}{n})^\alpha \cdot 1 - a = 1\]
\[(30) \quad D_a = \frac{1}{\frac{\alpha}{(1 - \frac{k}{n})^{1 - a}}}\]

Total land given up to allegados, \(nD_a\), therefore is:

\[(31) \quad nD_a = \frac{n}{\frac{\alpha}{(1 - \frac{k}{n})^{1 - a}}}\]

To find the \(n\) that minimizes land given up and therefore maximizes arrendire income, we set the derivative with respect to \(n\) equal to zero, i.e.,
\[
(32) \quad \frac{1 - n}{1 - \alpha} \left( \frac{1 - K}{n} \right)^{-\frac{1}{2}} \frac{a}{n} \left( 1 - \frac{K}{n} \right)^{\frac{1}{1 - \alpha}}
\]

which simplifies to:

\[
(33) \quad n = \frac{1}{1 - \alpha} \frac{a}{K}
\]

Since statistical studies of production functions generally produce values between 0.5 and 0.75, we therefore conclude that the number of allegados per arrendire is likely to be two to four times the share of total arrendire labor time contractually committed to the hacienda.

Regarding arrendire contracts with haciendas, Craig concluded:

"There appears to have been a wide variation among the haciendas in the valley with regard to the total number of days per month that an Indian tenant would have to work for the hacendado. The average would appear to be between ten and fourteen days per month, but on occasion this rose to as high as twenty or twenty-five days." 24/

Hobsbawn, citing a number of sources, reported labor obligations on a more disaggregated basis, 5 but the final result was approximately the same: The hacienda required somewhat less than half the arrendire's labor time, say about 40%. By the assumptions used here, this suggests that the ratio of allegados to arrendires should lie between 0.8 and 1.6. Hobsbawn also reprints some data on this ratio as reported by Kuczynski-Godard in the 1940's, viz.: 6

| Hacienda San Lorenzo: | 33 arrendires, 39 allegados |
| Hacienda Chancamayo: | 41 arrendires, 57 allegados |
| Hacienda Echarte: | ca. 70 arrendires, each with 3-10 allegados |

---

4 Craig 1969, p. 779, citing surveys from the 1930's reported in Cuadros y Villena 1949.


6 Hobsbawn 1969, p. 41, citing Kuczynski-Godard 1946a
The ratios of the first two haciendas (1.18 and 1.39 respectively) clearly correspond to the model's prediction; in the case of the third, something has clearly gone awry among the assumptions, the most likely point of failure being the assumption that allegados delivered labor services only to the hacienda. One suspects that arrendaires dealing with upwards of 10 allegados were profiting from unpaid labor service on their own lands, and had thus set themselves up as hacendaditos.
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