On the Organization of Rural Markets and the Process of Economic Development

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How does the organization of rural land and labor markets affect capital accumulation and long-run aggregate income in the development process? We show that in a simple dual economy model capital accumulation and aggregate income will be lowest when both factor markets in agriculture are fully competitive, higher when land is not traded but the labor market is competitive, and may be highest in the absence of competitive markets in both factors in the agricultural sector.

The dual economy growth model (Arthur Lewis, 1954; Gustav Ranis and John Fei, 1961; Dale Jorgenson, 1961; and Avinash Dixit, 1973) is thought to provide a good description and tool of analysis for problems of development. The sectoral division chosen reflects several key distinctions between the agricultural and manufacturing sectors. The main one of course has been product specialization, the agricultural sector producing food, used solely for consumption, the industrial or manufacturing sector producing goods which may be used for either consumption or investment.

Product specialization is not the only difference between the two sectors, however. Factor inputs and methods of production are quite different, as is the location of the two sectors, agriculture of course being predominantly rural, manufacturing predominantly urban. The economic and social organization of the two sectors can be quite different as well. We find a number of countries in which the manufacturing sector is mainly competitive or "capitalist," while the rural sector is largely characterized by noncompetitive land and labor markets, a description common to many models of development.

A central question which development models address is the transition from a low-income rural economy to a higher-income urban or manufacturing economy. Typically, the focus of interest has been on a positive description of the dynamics of the economy or on government policies to foster capital accumulation, which is the main source of growth, taking as given the basic characteristics set out above. Specifically, the literature has emphasized the role of rural income and the agricultural surplus in affecting the migration of labor and the growth of the economy. Lewis, 1954, and Ranis and Fei, 1961, emphasized the need for surplus labor in agriculture, while Jorgenson, 1961, stressed the effects of rural income and food supply in inducing migration to the urban sector.

The focus of this paper is quite different. Rather than considering only a single type of organization of the rural sector, we ask how changes in its organization will affect the process of development. More specifically, we ask how the organization of rural factor markets will affect saving and the accumulation of capital in the short- and long run. We

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will look at rural land and labor markets and compare the competitive case (that is, freely traded factors being paid their marginal products) with the case where markets are noncompetitive or nonexistent.

Our interest in the organization of the rural sector is motivated by, among other things, the question of land and other sorts of reforms in the rural sector. Specifically, the argument for more equal distribution of land or competitive payments to labor is that these will increase welfare of rural workers. While a given reform may clearly increase worker welfare in a static model where factor supplies to each sector are fixed, whether the same will be true in a dynamic model in the longer run will depend on how factor supplies are affected. This means considering both the process of equilibrium migration from rural to urban sector and the process of capital accumulation. If a given reform significantly affects capital accumulation, its long-run effect on welfare may be quite different from its short-run effect. The main result of this paper is to show that in a simple growth model, the steady-state capital stock may be lower when rural land and labor markets are competitive than when competitive markets for either or both of these factors are absent. This suggests that any evaluation of rural reform should be done in an explicitly dynamic model.

We consider a market-clearing, overlapping generations model with saving and capital accumulation. Migration thus becomes an equilibrium phenomenon, with workers migrating to equalize wages between the rural and the urban sector. To highlight our interest in the saving process and the land market, we will assume that there is no population growth, no technical progress,[1] and that agricultural and manufacturing goods are perfect substitutes in consumption. On the production side the two sectors differ by the assumption that capital is an input only in manufacturing (and can only be produced in the manufacturing sector), whereas land is used only in agriculture. These assumptions allow us to focus on the role of rural land and labor markets in affecting capital accumulation in the urban sector.

The organization of the paper is as follows. In Section I we present the general setup of the model. Section II presents the benchmark competitive case, while in Section III we consider a model where land is not traded and compare it to the competitive economy. In Section IV we consider the case in which there are neither competitive land nor labor markets in the rural sector. In this section we also compare results of the various models in terms of the steady state and the dynamic equilibrium path of the capital stock. In Section V we analyze the optimality of the allocations that result from the exclusion of the markets. Section VI contains our summary and conclusions.

I. The Model

We consider a model with two sectors.[2] The urban sector produces commodity Y using capital K and labor L^y as inputs. Output is given by

$$Y = G(K, L^y). \tag{1}$$

Y can be used for consumption or investment (that is, capital accumulation). The rural sector produces (agricultural) commodity X using only land A and labor L^x with output given by

$$X = F(A, L^x). \tag{2}$$

X is used only for consumption and is not

[1] In models where land is fixed and essential to production, exogenous population growth and technical progress must balance each other in steady state. Our assumption, therefore, in no way changes the basic characteristics of the steady state. Jorgensen, 1961, Dixit, 1973, and Paul Zarembka, 1970, analyzed issues of exogenous technical progress, food production, population growth, and the elasticity of food consumption in affecting the development process. Here we abstract from these issues.

[2] A model extremely close in setup to this one is that of Jonathan Eaton (1987), which analyzes international trade questions. Jean Tirole (1985) carefully analyzes the role of nonproduced assets in the Diamond model.

storable. Both $F(\cdot)$ and $G(\cdot)$ are continuous, twice differentiable, and linear homogeneous, with positive output requiring positive inputs of both factors. Furthermore, as an input approaches zero, its marginal product approaches infinity, given a positive value of the other input. We further assume that labor is perfectly mobile between sectors with zero cost.

The total supplies of land A, initial capital K_0, and labor L are exogenously given. Hence, the production of the agricultural good can change only with changes in labor input in that sector and is bounded above by the total supply of land and labor.

Population consists of L people in each generation, each of whom lives for only two periods. In each generation at time t L_t^x people are working in the rural sector and $L_t^y(=L-L_t^x)$ in the urban sector. e_t^x and e_t^y are the fractions of the total population in the rural and urban sectors at t. All workers are homogeneous in skills and preferences. For simplicity, we assume that X and Y are perfect substitutes in consumption. Total consumption at age $i(i=1,2)$ in period t for an individual is defined as

$$c_t^i = x_t^i + d_t^i, \tag{3}$$

where x_t^i and d_t^i is individual consumption of the agricultural and manufacturing goods.

Perfect substitutes imply that relative demands are perfectly elastic, or, equivalently relative prices are fixed.[3] Therefore, even if one sector is not competitive, production must still be on the efficient frontier.

Each person is endowed with one unit of labor in his first period of life and no labor capacity in his second period of life. The individual decision problem when young is then given by choosing total consumption in each period and savings s_t to maximize utility

$$U = U\left(c_t^1, c_{t+1}^2\right) \tag{4}$$

subject to

$$c_t^1 = w_t - s_t + \alpha_t^1 \tag{5}$$

$$c_{t+1}^2 = R_{t+1}s_t + \alpha_{t+1}^2, \tag{6}$$

where w_t is wage income from work, α_t^i represents possible other sources of income in the ith period of life, and R_{t+1} is one plus the interest rate in period $t+1$.[4] The first-order condition for a maximum is

$$\frac{U_1(\cdot,\cdot)}{U_2(\cdot,\cdot)} = R_{t+1}, \tag{7}$$

which yields a general saving demand function for the young

$$s_t = s\left(w_t + \alpha_t^1, \alpha_{t+1}^2, R_{t+1}\right). \tag{8}$$

One can show that if consumption is normal, saving of the young is increasing in first-period income and decreasing in second-period exogenous income.

II. The Benchmark Competitive Case

In all the economies that we analyze we assume that the manufacturing sector is competitive. The representative firm in this sector chooses K_t at time $t-1$, and L_t^y at t to maximize profits which are given by

$$\pi_t^y = q_t G\left(K_t, L_t^y\right) - w_t L_t^y + (1-\delta) q_t K_t - R_t q_{t-1} K_t, \tag{9}$$

where q_t is the price of Y in terms of X. Since the model is deterministic, we assume perfect foresight, so that we obtain the following first-order conditions:

$$w_t = q_t G_L\left(k_t, e_t^y\right) \tag{10}$$

$$q_{t-1}R_t = q_t(1-\delta) + q_t G_K\left(k_t, e_t^y\right), \tag{11}$$

[3] This assumption can be interpreted as the economy being small and open to trade in the two products.

[4] This setup assumes a perfect consumption-loan market. Imperfections in the capital market, sometimes thought to characterize the secondary sector, are here captured in the modeling of the land market.

where $k_t = K_t/L$ is capital per capita. Market-clearing conditions for Y imply that

$$(12)\qquad k_{t+1} - (1-\delta)k_t + d_t^1 + d_t^2 \le G(k_t, e_t^y) = \frac{Y_t}{L}.$$

If consumption of Y is positive, our assumption on preferences implies that the price of Y will equal that of X and q_t will equal 1. If Y is not consumed, entire urban output going to capital accumulation, then $q_t \ge 1$, with strict inequality holding when desired k_{t+1} exceeds urban output. The price of consumption is then the price of the agricultural good. Since capital is accumulated only for future production of Y and since increased Y increases welfare only if it is consumed, zero consumption out of urban output is possible only in the short run. In the long-run steady state, consumption of Y must be positive, so that q must equal one. In early periods of development, however, the price of the urban output would be greater than that of the consumption good. For simplicity we consider economies that are sufficiently developed that some urban output is consumed, so that $q = 1$ along the path.

The economies in this paper differ with respect to the organization of the agricultural sector. As a benchmark we use the fully competitive framework, where both land and labor are fully traded. Let P_t be the price of land in terms of consumption at time t. At $t = 1$ the stock of land is divided equally among the initial population of old people. Land is purchased at time t for use in production at time $t+1$. The optimization problem of producers of the agricultural good X is to maximize profits in each period, namely to maximize

$$(13)\qquad \pi_t^x = F(A_t, L_t^x) - w_t^x L_t^x + P_t A_t - R_t P_{t-1} A_t$$

by choice of A_t at $t-1$ and L_t^x at t. (Writing $P_t A_t - R_t P_{t-1} A_t$ as $(P_t - P_{t-1})A_t - r_t P_{t-1} A_t$, where $r = R - 1$, we see that the profits from land include capital gains and are net of user cost.) The necessary conditions for a maximum are

$$(14)\qquad w_t = F_L(A/L, e_t^x)$$

$$(15)\qquad R_t = \frac{F_A(A/L, e_t^x) + P_t}{P_{t-1}}.$$

In the fully competitive economy both sectors face the same wage w_t and interest factor R_t.

The market-clearing condition for Y is as given above while that for X is

$$(16)\quad x_t^1 + x_t^2 = F(A/L, e_t^x) = X_t/L.$$

The other two markets that must be cleared at each date are those for labor and capital, implying

$$(17)\qquad e_t^x + e_t^y = 1$$

$$(18)\quad s(w_t, R_{t+1}) = k_{t+1} + P_t A/L.$$

The equilibrium path for this economy is solved simultaneously by equations (8), (10)–(12), and (14)–(18) for given initial values of L, K_0, and A. (Here α^1 and α^2 are identically equal to zero, since competitive factor payments exhaust total output.) This yields not only a dynamic path for k at each t, but for prices and quantities at all dates as well. An important characteristic of the dynamic equilibrium growth path of this competitive economy is that for given exogenous variables, along the path the urban labor force and the real wage are increasing as the per capita capital stock increases. (This refers to characteristics of the path, not to comparative statics.) Since the marginal product of labor must be equal in the two sectors, an increase in the capital stock induces migration to the capital-using urban sector. As land is fixed, the real wage in the rural, and hence the urban, sector rises. (Using (10), (14), and (17) and differentiating with respect to k and e^x immediately yields the result.)

Hence, the competitive equilibrium is characterized by a path consistent with the widely accepted facts of a positive relation between growth in production on the one hand, and migration and real wages on the other. (See, for example, John Harris and Michael Todaro, 1970.) These properties of the equilibrium should be part of any model of development. Here they arise endogenously from the basic characteristics of the economy.

We now turn to the steady state of the competitive economy, which will serve as a point of comparison for the steady states of the other economies. Eaton (1987) states sufficient conditions for the existence of a steady-state allocation of this model in which both goods are produced and consumed. These conditions ensure that saving is sufficiently large so that the equilibrium path does not converge to an allocation in which land value exhausts all saving. The steady state of the competitive economy is characterized by the following five equations:

$$s(w,R)=k+P\cdot A/L, \tag{20}$$

$$w=G_L(k,1-e^x), \tag{21}$$

$$R=(1-\delta)+G_K(k,1-e^x), \tag{22}$$

$$w=F_L(A/L,e^x), \tag{23}$$

$$R=\frac{F_A(A/L,e^x)+P}{P}. \tag{24}$$

These five equations may be solved for the five steady-state values of the endogenous variables k, P, w, R, and e^x.

From (21) and (23) we can find the steady-state relation

$$e^x=e^x(k), \tag{25}$$

which has a negative first derivative (see (19a)). Substituting (25) into (24) and (23), we obtain w and R as functions of k. k is solved from equation (20). We refer to the allocation in the fully competitive economy as allocation "CE."

III. Competitive Labor Markets with a Group of Landlords

We now consider an economy in which the rural labor market is competitive as in Section II (as of course is the urban labor market), but where land is not traded. We assume there is a subgroup of workers of unchanging size L^T who are also the owners of land. For reasons exogenous to the model, they do not sell the land but pass it on to their descendants. With constant population, we take the number of landlords to be fixed over time at L^T comprising a fraction e^T $(=L/^TL)$ of the population. Suppose the rent from land accrues to landlords in their second period of life. Let α_t^2 be the income from this land so that

$$\alpha_t^2=\left(F(A/L,e_t^x)-w_te_t^x\right)/e^T. \tag{26}$$

Landlords choose e^x to maximize α_t^2, implying that condition (14) holds as in the CE economy. We assume that landlords also work. However, condition (15) does not hold and P_t is not defined since no land market exists. Aggregate saving is now defined by

$$(1-e^T)s(w_t,R_{t+1}) + e^Ts\left(w_t,R_{t+1},\alpha_{t+1}^2\right)=k_{t+1}. \tag{27}$$

The equilibrium path of this economy is determined by equations (8), (10)–(12), (14), (16), (17), (26), and (27). Obviously, $k_t>0$ for all t since capital is the only form of saving when land is not traded. As before, the urban labor force and the real wage are increasing along the path as the per capita capital stock increases.

The steady state of this economy is described by the following equations:

$$(1-e^T)s(w,R) + e^Ts\left(w,R,\alpha^2\right)=k, \tag{28}$$

$$w=G_L(k,1-e^x), \tag{29}$$

$$R=(1-\delta)+G_K(k,1-e^x), \tag{30}$$

$$w=F_L(A/L,e^x), \tag{31}$$

where α^2 is defined by (26) with no time subscript in steady state. We refer to this allocation as "AC" (*almost* competitive).

We may now compare the dynamic paths and the steady-state allocations in the two economies CE and AC. These may be summarized as:

PROPOSITION 1: *Consider the* AC *and the* CE *economies starting with the same initial level of capital. If along the equilibrium path in the* CE *economy the price of land is increasing, constant, or only slightly decreasing over time, then the value of capital per capita and the urban labor force will be higher in the* AC *than in the* CE *economy at each date. An increase in the fraction of landlords will decrease the level of capital in the* AC *economy, moving it closer to that of the* CE *economy.*

PROOF:

See the Appendix.

As a corollary, one immediately notes that since the price of land is constant in a steady state, the steady-state values of capital per capita and the urban labor force are higher in the AC than in the CE economy.

The intuition of this result is that the competitive economy has less capital as there exists land as a second traded asset which lowers saving available for capital accumulation. Increasing the number of landlords widens land ownership, thus lowering saving available for capital. This result is interesting for it says that the nonexistence of the land market will induce higher capital accumulation (as well as a larger urban sector). Therefore the absence of a competitive market will yield a higher level of income, though one which is unequally distributed between the two classes of owners and non-owners of land. In Section IV we further investigate this question by considering the case of reorganizing the rural labor market by redistributing rents from land among workers in the agricultural sector.

IV. Absence of Competitive Land and Labor Markets

We now consider an economy where neither competitive land not labor markets exist in the rural sector. We retain the assumption of the previous section about land distribution and the absence of a market and add to it the assumption that workers in the agricultural sector do not receive their marginal product, but rather a share $1-\mu$ of average product per worker (where μ is between 0 and 1). When $\mu=0$ we have the case where land is divided among rural workers, a sort of total agrarian reform. μ could be viewed as resulting from a tenancy relation in agriculture which is common in developing nations. We take μ to be determined exogenously.

As before, migration ensures the equality of the wage between the two sectors, implying

$$w_t = G_L(k, 1-e_t^x), \tag{32}$$

$$w_t = (1-\mu)\frac{F(A/L, e_t^x)}{e_t^x}. \tag{33}$$

The rest of income from agriculture is divided among the L^T landlords in the economy. We assume, as before, that landlords receive this income in the second period of their lives. Though the timing of the payment of rents may appear quite innocuous, it will in fact be crucial and therefore deserves comment. In a life-cycle model saving arises from the desire to transfer income from early periods of life in which the individual receives income to later periods when he does not. The effect of rental income on individual saving and hence on aggregate capital accumulation therefore depends on whether it induces or replaces saving. To the extent that rental income in this hereditary ownership model would probably be concentrated in later periods of life, we stress the role of rents as replacing other forms of saving and assume they are received in the second period of life. This implies that

$$\alpha_t^2 = \mu\frac{F(A/L, e_t^x)}{e^T}. \tag{34}$$

Before characterizing the steady state, we demonstrate that the conditions for the urban labor force to grow along the dynamic path as the capital-labor ratio grows along the path are the same as before. Equating (32) and (33) and differentiating, we obtain

$$(35)\quad \frac{de_t^x}{dk_t}=\frac{e_t^x G_{KL}}{(1-\mu)\left(F_L-F/e^X\right)+e_t^x G_{LL}}.$$

From the concavity of $F(\;)$ we know that $F_L < F/e^x$. Hence de_t^x/dk_t is negative as long as $G_{KL}>0$, and along the equilibrium path, workers migrate to the urban sector as the capital stock grows. This result is independent of the way in which the rent from land is divided between rural workers and landlords. The lower the share of rents going to workers (the larger is μ), the more migration there will be. This accords with common sense.

The steady-state allocation in this share economy (which we denote "SE") is characterized by

$$(36)\quad (1-e^T)s(w,R)+e^T s(w,R,\alpha^2)=k$$

$$(37)\quad w=G_L(k,1-e^x)$$

$$(38)\quad R=1-\delta+G_K(k,1-e^x)$$

$$(39)\quad w=(1-\mu)\frac{F(A/L,e^x)}{e^x}$$

$$(40)\quad \alpha^2=\mu\frac{F(A/L,e^x)}{e^T}.$$

We may characterize the SE allocation relative to the AC (and ultimately the CE allocation) in the following propositions.

PROPOSITION 2: *The steady-state allocation in the* SE *economy is equivalent to that in the* AC *economy if $1-\mu$ is set equal to the steady-state share of labor in the agricultural sector in the* AC *economy, that is, $1-\mu^*$. If the share of labor $1-\mu$ in the* SE *economy is greater than (less than) the competitive share, then the steady-state capital stock in the* SE *economy will be greater than (less than) that in the* AC *economy.*

PROOF:
See the Appendix.

Combining this result with Proposition 1, we see that the steady-state capital stock will be highest in the absence of competitive factor markets when income distribution favors rural workers over landlords ($\mu<\mu^*$), next highest in the "almost" competitive economy where land is not traded, and lowest in the fully competitive economy. One may note as a special case that when all land is divided among agricultural workers ($\mu=0$), the steady-state capital stock will be higher than in the competitive and almost competitive economies. Out of steady state μ^*_t is changing. Hence, we can write a proposition only for constant μ which is less than μ^*_t for all $t\geq 1$.

PROPOSITION 3: *Suppose the distribution of land rents is such that $\mu<\mu_t^*$ for all $t>0$. Then, if the* AC *and* SE *economies start with the same capital stock, the capital stock in the* SE *economy will be greater than the capital stock in the* AC *economy for all future dates.*

PROOF:
See the Appendix.

The intuition behind this result is easy to see. Agricultural workers receive the average product of labor in the SE economy, but the marginal product of labor in the AC economy, which is lower for $\mu<\mu^*$. Hence agricultural wages are higher in the SE economy for $\mu<\mu^*$. Furthermore, the rents from land, α^2, for landlords are smaller. Hence, savings of workers and landlords in the SE economy are unambiguously larger than in the AC economy.

As a corollary, one notes this is of course true for $\mu=0$. Note that the case of $\mu=0$ is equivalent to the standard dual economy models of the type described by Jorgenson (1961) and Dixit (1973). In these models all income from agriculture is divided among the rural population. Hence, among the economies that are described here the standard dual economy, in which there is no land market, has the highest steady-state capital stock and an equal income distribution. The competitive economy in which a land market exists also has an equal income distribution but the lowest capital stock in steady state.

If one interprets land reform as a shift in income distribution toward agricultural workers and away from landowners, then we see that land reform will increase capital accumulation and income in the long run. In fact, the same result will hold in the short run, if we think of any economy along its growth path suddenly "decreeing" a decrease in μ. This result does not accord with the standard view of development (see, for example, Simon Kuznets, 1966), which associates higher capital accumulation and growth with a more unequal income distribution, and hence sees land reforms as introducing a fairer income distribution in the short run at the expense of higher long-run growth. This analysis presents a model where these two goals need not be traded off.

The reasons for the difference in results are easy to explain. The reasoning that usually lies behind the standard result is that saving is specified in a somewhat *ad hoc* manner, with the propensity to save being zero for low levels of income and then rising as income rises. Under such a specification, a more unequal distribution of a given level of income will increase the aggregate saving rate. In this model saving was derived from a basic life-cycle model, so that the receipt of rental income in later periods of life would tend to discourage saving and hence capital accumulation. Shifting the distribution of income away from rents and toward wages received in earlier periods of life would therefore increase saving and capital accumulation.

One can now also see why the competitive economy CE has less capital accumulation than the almost competitive economy AC. When land is traded, there are two assets with which to save, so that the amount of saving going to capital accumulation is less than if land is not traded. On the other hand an increase in the group of landlords in the AC economy would decrease the level of capital accumulation. Hence, the way that the rents from land are distributed in the economy is crucial in its effects.

V. Optimality

We now consider the optimality of the allocations of the various economies in the short and long run. The steady-state competitive allocation satisfies the condition that $R=1+F_A/P>1$, from equation (24). Hence, the standard Koopmans-Phelps dynamic efficiency criterion implies that the CE economy has a dynamic optimal allocation of resources over time (see Bennett McCallum, 1986, for the case of land.) However, the steady state of the CE economy is not the Golden Rule. (If *nonproductive* land with a positive price were added to the Diamond model as a second asset, the CE allocation would be the Golden Rule allocation.) In order to formalize this result, we begin by considering the allocation that maximizes steady-state welfare with equal distribution across all individuals. This is given by the solution to the following maximization problem

$$(41) \qquad \max_{c^1, c^2, k, e^x} U(c^1, c^2),$$

subject to

$$(42) \qquad G(k, 1-e^x) + F(A/L, e^x) - \delta k = c^1 + c^2.$$

The first-order conditions are

$$(43) \qquad G_L(k, 1-e^x) = F_L(A/L, e^x),$$

$$(44) \qquad G_K(k, 1-e^x) = \delta$$

$$(45) \qquad \frac{U_1(c^1, c^2)}{U_2(c^1, c^2)} = 1.$$

Equations (43) and (44) are the conditions for maximum aggregate consumption $c^1 + c^2$. Equation (43) allocates labor efficiently between the two sectors. Equation (44) is the Golden Rule for this economy since population growth is zero. Equation (45) guarantees that the distribution of consumption over the life cycle is consistent with zero population growth. We denote this allocation by "GR" (Golden Rule). We first show the relation between the GR allocation and the competitive steady-state allocation.

PROPOSITION 4: *The steady-state competitive allocation* CE *is not the Golden Rule and the per capita steady-state capital stock in the* CE *economy is smaller. This also implies a smaller urban labor force in the* CE *than in the* GR *allocation.*

PROOF:
See the Appendix.

Proposition 4 implies that the steady-state competitive allocation does not maximize utility of the representative agent, the capital stock being below the Golden Rule level. One obvious way of intervening in the land market to reach maximum steady-state utility is to tax away the physical marginal product of land and then distribute the proceeds by lump-sum transfers.[5] Then, the only reason for holding land would be for capital gains. Land would be traded in steady state at a zero interest rate. (Land prices could be zero, with no land traded and steady-state R greater than one.)

Proposition 1 says that in steady state $k^{\mathrm{CE}} < k^{\mathrm{AC}}$, while Proposition 4 says that $k^{\mathrm{CE}} < k^{\mathrm{GR}}$. Hence, it is possible that the steady-state allocation in the AC economy is the Golden Rule allocation. This is the case if R in equation (30) is equal to 1. In general, we know that dynamic efficiency implies that the AC economy achieves an optimal dynamic allocation only if $R \geq 1$. This suggests that an economy without a land market may reach the GR allocation and yield higher steady-state welfare (on average across individuals) than one with land being freely traded. (Since the existence of landlords implies *intra*generational heterogeneity, it is possible that some agents may be worse off. However, since total output is higher, nondistortionary intragenerational transfers could be used to make all individuals better off at the steady state relative to the competitive case.)

In addition, for the case where the rural labor market is distorted as well, a particular set of lump-sum taxes on landlords' income from land (α^2) combined with a transfer to first-period consumption will guarantee that $R = 1$, implying the Golden Rule Allocation. This may be seen manipulating equations (5)–(7) for the landlords. However, this policy yields the Golden Rule only as far as production is concerned. On the consumption side, there are two groups that only get higher welfare in steady state on "average." If $e^T = 1$, land is divided equally among all the population, then the steady state of the AC economy with $R = 1$ has exactly the GR allocation. Note, however, that a higher e^T implies a lower k^{AC} so that the policy guaranteeing that $R = 1$ for a lower value of e^T will not yield the production GR under equal distribution.

The allocation of the SE economy is not optimal since the wage rate in the agricultural sector is not equal to the agricultural workers' marginal product, unless μ is equal to $F_L e_t^x / F(\ \ )$ at each point of time. (This last condition is, of course, impossible for μ fixed.) In particular, if $\mu = 0$ the wage is higher then the marginal product of labor and the economy is overaccumulating capital (Proposition 4). Hence, we find that the standard dual economy model distributes income equally among workers and generates more growth than the other economies but has an inefficient allocation.

VI. Summary and Conclusions

The main result of this paper is that competitive land and labor markets in the agricultural sector may induce less saving in physical capital, and hence reduce the long-run income of the economy,[6] relative to the

[5] Martin Feldstein's (1977) analysis also implies that a land tax could be used to improve the allocation in the CE economy. Neil Wallace has stressed to us that the sorts of changes in organization of markets that we discuss could be mimicked by the appropriate sort of tax. For example, a 100 percent tax on land rents in the CE economy appropriately redistributed would mimic the AC economy.

[6] The general point is that making a market noncompetitive (for example, monopolizing supply of a factor)

case of noncompetitive or nonexistent markets. This indicates not simply that the organization of markets in the economy may have a significant effect on the economy's development in the short and long run, but that a simple move toward more competitive rural markets need not imply an increase in welfare.

Why does the absence of competitive markets "favor" capital accumulation in this model? With a land market, as was indicated above, the possibility of saving in the form of land "crowds out" capital, in exactly the way that internally held government debt in the Diamond model reduces capital accumulation and may reduce welfare even though it expands the individual's choice set. The existence of some other asset such as money would have similar implications.

Noncompetitive rural labor markets may favor capital accumulation if the move away from competitive labor markets increases labor's share in the agricultural sector and if this increase in labor's share increases saving. We contrast this to the conventional wisdom that saving will be higher with a noncompetitive rural labor market only if labor's share is relatively low with noncompetitive market organization. If landlords receive income from the ownership of land in later periods of life, a distribution of rural income favoring labor would raise saving in this sector rather than lower it. In short, the move toward competitive rural markets might both lower total saving and lower the fraction of a given volume of saving going to capital.

Of course, there are other arguments which would yield a welfare-*enhancing* role for a more competitive organization of markets. This paper simply makes clear that in terms of its effects on capital accumulation in a simple model, competition need not increase welfare, implying that analyzing the effects of a change in market organization must be done in the context of a fully specified dynamic model.

may be welfare improving in the long run in a dynamic model.

Appendix: Proofs of Propositions 1, 2, 3, and 4[7]

PROOF OF PROPOSITION 1:

The equilibrium conditions for the two economies may be written from (20) for the competitive economy

$$\text{(CE)}\quad s(w_t, R_{t+1}) = k_{t+1} + P_t A/L$$

and from (28) for the almost competitive economy

$$\text{(AC)}\quad s(w_t, R_{t+1}) = k_{t+1} + e^T\big(s(w_t, R_{t+1}) - s(w_t, R_{t+1}, \alpha_t^2)\big).$$

To prove the proposition, we consider the position of the two curves in $k_t - k_{t+1}$ space. For (CE) we note that for $P_t \geq P_{t-1}$ we may write

$$\begin{aligned} P_t A/L(R_{t+1}-1) &= \frac{A}{L}(R_{t+1}P_t - P_t)\\ &\geq \frac{A}{L}(R_{t+1}P_{t-1} - P_t)\\ &= F_A A/L \quad (\text{from } (15))\\ &= F(A/L, e_t^X) - F_L e_t^X, \end{aligned}$$

from the linear homogeneity of $F(\ )$. This last expression equals $e^T\alpha_t^2$ in the AC economy from (26). We may therefore write, when $P_t \geq P_{t-1}$,

$$\text{(A1)}\qquad \frac{P_t A}{L} \geq e^T \frac{\alpha_t^2}{R_{t+1}-1}.$$

To evaluate this, saving in the AC economy may be written $s(w_t, R_{t+1}, \alpha_t^2) = (c_{t+1}^2 - \alpha_{t+1}^2)/R_{t+1}$ from (6). If c^2 is everywhere normal an increase in α^2 implies that c^2 rises, so that s falls by less than α^2/R rises, meaning that the sum of $s + (\alpha^2/R)$ rises. Noting that $s(w, R)$ is simply $s(w, R, \alpha^2 =$

[7]Efraim Sadka suggested using stability conditions to prove these propositions for the general case.

On the Organization of Rural Markets and the Process of Economic Development

By ALLAN DRAZEN AND ZVI ECKSTEIN*

How does the organization of rural land and labor markets affect capital accumulation and long-run aggregate income in the development process? We show that in a simple dual economy model capital accumulation and aggregate income will be lowest when both factor markets in agriculture are fully competitive, higher when land is not traded but the labor market is competitive, and may be highest in the absence of competitive markets in both factors in the agricultural sector.

The dual economy growth model (Arthur Lewis, 1954; Gustav Ranis and John Fei, 1961; Dale Jorgenson, 1961; and Avinash Dixit, 1973) is thought to provide a good description and tool of analysis for problems of development. The sectoral division chosen reflects several key distinctions between the agricultural and manufacturing sectors. The main one of course has been product specialization, the agricultural sector producing food, used solely for consumption, the industrial or manufacturing sector producing goods which may be used for either consumption or investment.

Product specialization is not the only difference between the two sectors, however. Factor inputs and methods of production are quite different, as is the location of the two sectors, agriculture of course being predominantly rural, manufacturing predominantly urban. The economic and social organization of the two sectors can be quite different as well. We find a number of countries in which the manufacturing sector is mainly competitive or "capitalist," while the rural sector is largely characterized by noncompetitive land and labor markets, a description common to many models of development.

A central question which development models address is the transition from a low-income rural economy to a higher-income urban or manufacturing economy. Typically, the focus of interest has been on a positive description of the dynamics of the economy or on government policies to foster capital accumulation, which is the main source of growth, taking as given the basic characteristics set out above. Specifically, the literature has emphasized the role of rural income and the agricultural surplus in affecting the migration of labor and the growth of the economy. Lewis, 1954, and Ranis and Fei, 1961, emphasized the need for surplus labor in agriculture, while Jorgenson, 1961, stressed the effects of rural income and food supply in inducing migration to the urban sector.

The focus of this paper is quite different. Rather than considering only a single type of organization of the rural sector, we ask how changes in its organization will affect the process of development. More specifically, we ask how the organization of rural factor markets will affect saving and the accumulation of capital in the short- and long run. We

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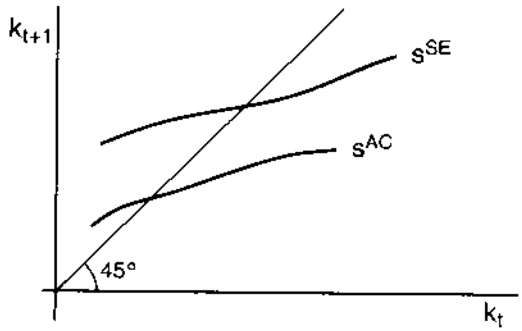

FIGURE 2

Since in addition $\alpha^{SE} < \alpha^{AC}$, $s(w^{SE}, R^{SE}, \alpha^{SE}) > s(w^{AC}, R^{AC}, \alpha^{AC})$. For given e^T, average saving per capital, s^{SE} is therefore unambiguously greater than s^{AC} at each level of k. Stability requires that an increase in k raises steady state s less than proportionally, so that the curve cuts the 45° line in Figure 2 from above. Therefore, k^{SE}, steady-state capital per capita in the SE economy, is unambiguously larger than k^{AC}, steady-state capital per capita in the AC economy. This completes the proof.

PROOF OF PROPOSITION 3:

The proof of the proposition is conceptually identical to the proof of Proposition 2. For given k_t, $\mu < \mu_t^*$ automatically implies that $w_t^{SE} > w_t^{AC}$. Similarly, at given k_t, $\alpha_t^{SE} < \alpha_t^{AC}$. Therefore, for the same level of k_{t+1} (which of course is not an equilibrium), s^{SE} would exceed s^{AC}. Since $ds/dR_{t+1} > 0$ and $dR_{t+1}/dk_{t+1} < 0$, the equilibrium curve (SE) must lie above (AC) in $k_t - k_{t+1}$ space. Stability conditions require that the curve cut the 45-degree line from above, as in Figure 2. Therefore, starting at the same k_t, $k_{t+j}^{SE} > k_{t+j}^{AC}$, for all $j \geq 1$.

PROOF OF PROPOSITION 4:

In the CE allocation $R > 1$ due to equation (24). Hence from (7) c^1 and c^2 are not the same as in the GR allocation. Furthermore k and e^x cannot be the same since (22) and (24) imply that in the CE allocation G_K is greater than δ while in the GR allocation they are equal. Equation (43) holds for both CE and GR implying that e^x is the same function of k in both allocations, where the derivative of e^x with respect to k is negative. Hence, the function $G_K(k, 1 - e^x)$ is the same for both allocations, and we have that

$$\frac{dG_K}{dk} = G_{KK} - G_{KL} \cdot \frac{G_{KL}}{G_{LL} + F_{LL}}$$

$$= \left(G_{KK}F_{LL} + G_{KK}G_{LL} - G_{KL}^2\right)$$

$$\times (G_{LL} + F_{LL})^{-1}.$$

The term in the first parentheses is positive due to the strict concavity of G while the term in the second parentheses is negative. G_k is therefore decreasing in k.

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