Can Labor-Capital Models Predict the Responses of Agrarian Societies to Development? Part II: Alternative Models

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Part II: Alternative Models

By DAVID H. SMILEY*

ABSTRACT.   Part II of this article presents a model that accords with the needs stated in Part I which appeared in the previous issue of this Journal. It noted that *development* efforts and *economics* have relied upon two-factor, capital and labor neoclassical *economic models*. Failures have occurred when they were applied to *agrarian societies* where the ownership of land *rent* dictates particular institutional forms that engender resistance to development. It was argued that there is need for a new three-factor *development theory* which explicitly models land and its rent. Ideas of *Smith, Ricardo, George* and *Samuelson* were assembled as a basis for a computer *simulation* model that explores landed institutions and the *land* value flows resulting from different development strategies.

I

Introduction

PART I OF THIS ARTICLE in the last issue of this Journal (v ,) dealt with the problems in development and development strategies particularly as related to increasing gaps, or divergences, in well-being between developed and third world countries and between of economic groups within them (v 54, No. 4). These problems were related to the use of a two-factor growth model by econ-omists of several stripes.

What is now needed is a model that includes landed property and a model for its reform uncluttered by the institutional assumptions of socialism and capitalism.

Behind the practical problems of progress lie theoretical problems of defining factor efficiency in terms of production and distribution appropriate to third world institutional structures. Behind the measurement problems of poverty lie unresolved concepts and definitions of divergence. Is divergence naturally chronic? If so, is the implied objective of the mixed economy the maintenance of Gini coefficients within some politically accepted limits? Is taxation the best way of achieving this objective? And behind the remedies for slow progress and

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increasing poverty lie the confusions inherent in two-factor models of these remedies. Since, for 100 years, land has been aggregated with capital and rent with profit, data appropriate to three-factor analysis are understandably scarce. The building of models must precede empirical research. But, if development models have been so wrong for so long that much data is useless, we have two problems. For this reason, an exploratory, pedagogical three-factor computer model is being developed. Its structure, and its simulation of responses of a stereotypical third world economy to alternative development strategies, are now reported.

II

A Three-Factor Pedagogical Simulation Model for Evaluating Development Strategies

A SET OF MULTI-SECTOR ECONOMIC MODELS for forecasting production, distribution and divergence, with particular reference to land value flows is designated as "Sim." The model reported is that of third world development. Other models being developed include those of transition economies and of established mixed economies. The user of SIM is presented with a menu of models and invited to accept or change the parameters which drive each simulation. The results are displayed in simple tabular form on the computer screen, showing economic growth, distributions to land, labor and capital, and the divergence of Gini coefficients. Each model is constructed from appropriate single-sector sub-models, drawn from economic theory. These submodels may also be driven separately and displayed on the screen. The submodels are grouped according to their main variable:

The LABOR group includes SMITH (division of labor or human capital accumulation, increasing population, increasing wages), MALTHUS (increasing population, decreasing wages), and MIGRATION (rural debt and rural-urban migration).

The LAND group includes RICARDO (extensive development, increasing population and rent, decreasing wages) SAMUELSON (intensive development, increasing population and rent, decreasing wages) and ENCLOSURE (fixed population, decreasing land and wages, increasing rent).

The CAPITAL group includes HD2 (two-factor neoclassical Harrod-Domar production function, per capita GDP rises with capital accumulation and with capital efficiency), NOZICK (stereotypical capitalism), RAWLS (stereotypical socialism), and LEAKAGE (a typology of capital losses from the point of origin through to production).

The EQUITY group adds a three-factor distribution function to the basic Harrod-Domar submodel. HD3 is a factor-neutral version, but KBIAS allows for

factor bias in favor of rent or wages, depending on the type of investment. REFORM compares conventional land reform and transfer payment strategies. GEORGE distributes wages to labor, interest to capital, and rent to the state. DIVERGENCE projects the rise of intra and inter generational class structures from the private accumulation of land, physical capital and human capital under different taxation and redistributive constraints.

Components of these submodels are assembled into multi-sector models. SOUTH, the model reported here, is developed in three phases. Phase one drives a simulated agrarian economy from the golden age down to subsistence. At this point land rent, 50 percent of produce, is assumed to accrue to a small percentage of the population, say 5 or 10 percent. Also at this point, phase two, surplus population starts to migrate to the urban, informal economy, eventually fully absorbing the economic growth of the formal sector in meeting increasing infrastructure decay and welfare burdens. Phase three starts from the assumption that voluntary or coerced investment for growth is negligible, and proceeds to model alternative development strategies such as foreign aid, FDI, domestic redistribution policies, and domestic growth and redistribution via site revenue. The distributions to land and labor can be computed from Samuelson by assuming that technological change exactly offsets diminishing returns to capital. Gini coefficients of inequality can be computed from Samuelson's rent and wages and from the land ownership percentage assumed. Three sectors are simulated: rural, informal and urban. The simulations are based upon very rudimentary models, scarce data and many simplifying assumptions. Their conclusions should therefore be looked upon as a preliminary sensitivity analysis which might be useful in estimating the returns from research directions seldom reported in the literature.

The foreign aid simulation assumes recurrent annual loans at specified percentages of recipient GDP and at specified terms and rates. These assumptions are found to generate a similar straight line decline of Net Resource Transfers as that reported in Todaro (1989: 419). After this line turns negative, the ability to repay depends on economic growth, which depends, in turn, upon capital efficiency. In Boone's (1994) extreme (typical?) case where loans are consumed, not invested, capital efficiency tends to zero. Bankruptcy is inevitable with its timing depending on the other parameter settings. The simulation is capable of predicting percent leakage below which bankruptcy can be avoided, and the effect of leakage to land speculation, which is common apparently (Todaro, 1989: 413), upon Gini coefficients. The FDI simulation is of an extreme, enclave model where a fourth, enclave sector encloses and rents land, employing local displaced labor. The importing of capital and exporting of return on investment, a common neo-Marxist critique of the enclave, is assumed here in order to keep

the model simple, though this is not necessary to the simulation's objective of tracking land value flows resulting from enclosure and capital injections.

The poor results of this simulation may be criticized by comparisons with FDI successes in South East Asia, but these economies have already partly addressed their land problems and thus are not considered here as typical third world countries. Conventional domestic redistribution is not yet modelled, being at this time a partially analyzed collection of references to the inferior productive and distributive characteristics of land redistribution, collectivization, ceilings on land holdings, floors on wages, and taxes on incomes and assets of low visibility.

The Site Revenue simulation models the diversion of unearned rent, 50 percent of total agrarian product and 10 percent of total formal urban product, into revenue. This revenue massively exceeds that necessary for satisfactory economic growth, leaving a surplus for maintaining the Gini coefficients which have already been lowered by Site Revenue, and for the welfare and education programs which could be expected to further raise living standards, lower population growth, and make possible hitherto unaffordable conservation programs.

III

Conclusions

THIS PAPER has argued that there is a long-standing deficiency in development theories which attempt to apply two-factor labor-capital models to agrarian societies where it is the monopolization of land rent which significantly restrains progress and maintains poverty. As a result of this deficiency, data for appropriate empirical research may sometimes be aggregated to the point of uselessness. Therefore a first step is seen as the construction of a three-factor model of the third world's peculiar institutions and the land value flows resulting from different development initiatives. An attempt to construct such a model is described.

Appendix—The "South" Simulations

THE SIMULATIONS ARE BASED, wherever possible, on third world data averaged over comparable time periods and on a number of stated assumptions. Where sensitivity of the results to these has been tested, it appeared that the time scale rather than the conclusions were affected. The production, distribution, and divergence functions driving these simulations operate according to definitions which must be specified here.

LAND refers to environment less improvements, composed of sites of differing use value reflected in rent, generated extensively (Ricardo) and/or intensively (Samuelson).

LABOR refers to the whole sector population, all receiving a wage, some 5% or 10% receiving rent, both wage and rent generated by Samuelson's distribution function.

CAPITAL refers to production outputs recycled to enhance further production, generating an annual return of 5% (ignoring risk and inflation and assuming diminishing returns to capital are exactly offset by technological change).

GDP refers to the sector product of goods and services generated by a simple Harrod-Domar production function of population, savings and capital marginal productivity (KMP).

GINI refers to the Gini coefficient of inequality, calculated from wages and rent, its increase being referred to as "divergence."

The simulations are developed in 3 phases.

PHASE 1: THE DRIVE TO SUBSISTENCE. This assumes an agrarian sector, generated by the Samuelson or Enclosure submodel, in which increasing population density reduces labor marginal productivity and wages, while increasing rent, alongside a smaller, urban sector, generated by Smith's division of labor submodel.

PHASE 2: STAGNATION. Phase 2 opens when the agrarian sector reaches subsistence, and the urban sector reaches say 10% of total population and has acquired a noticeably higher wage than that of the rural sector. Rural-urban migration is now assumed, arising from coercion (the Basu rural debt submodel), persuasion (the Todaro income expectations submodel) and the perception of a rent-free urban infrastructure (sidewalks, railroads, water, street lighting, and recyclable shelter materials). The informal sector thus arising, creates an increasing civic burden which, together with the lack of significant urban savings, leads to the stagnation of the urban sector.

In the RURAL SECTOR the following holds: a) LAND—Quantity fixed, marginal product irrelevant, rent 50% of GDP; b) LABOR,—Quantity fixed at subsistence, hence 2% p. a. natural growth fully absorbed by urban migration: with Wage, net of rent, fixed at subsistence; c) CAPITAL—Constant in the absence of savings but insignificant, KMP low but irrelevant; d) GDP—Constant in the absence of growth; e) GINI — High, but constant with stable classes and incomes.

In the INFORMAL SECTOR the following holds: a) LAND—Irrelevant since no rent is paid; b) LABOR—Approaching, at the end of phase 2, 50% of total urban population—Net natural increase assumed held to zero by disease and malnutrition, actual increases being entirely due to rural migration—Net migration to and from the urban (formal) sector assumed to be zero—No rent— Very low wages from ambulatory services, begging and criminal activities; c)

CAPITAL—Irrelevant; d) GDP—Defies analysis, token estimate included; e) GINI: Irrelevant with only one class and no rent.

In the URBAN SECTOR the following holds: a) LAND:—Quantity fixed under intensive urban development, quantity increasing under extensive urban development, rent increasing under both—All development assumed factor-neutral, hence constant share to rent, assumed to be 10% of GDP; b) LABOR—Natural increase 2% p. a., Wage double that of rural sector, but now held constant by costs of growing informal sector; c) CAPITAL—Growing from zero to 5% p. a. from domestic savings, low KMP productivity of 0.15; d) GDP: Growing with population; e) GINI—High and rising, assuming growth of population faster than that of landowners.

PHASE 3: ALTERNATIVE DEVELOPMENT STRATEGIES. Phase 3 opens with a stagnant rural sector and an urban sector stagnating under the burden of a growing informal sector. Foreign and domestic initiatives now offer a choice of reform and development strategies.

The strategies simulated here are: Aid, Foreign Direct Investment, and Site Revenue. A fourth, reformist and redistributive collection of largely unsuccessful strategies is identified for possible future modelling.

THE AID STRATEGY. A recent study (Boone) of 96 countries suggests that, in all but a few countries, where aid exceeded 15% of GDP, aid was spent upon consumption rather than upon development. In this simulation the gap between expected and actual development arising from aid is characterized by a set of "leakages": at source, at application, and in unintended consequences such as increased rents and Gini coefficients. Though the relative contributions of these leakages is unknown, it would seem that, in many cases, they approach 100% of loan values.

In the RURAL SECTOR the following holds: a) LAND—Quantity fixed, rent fixed at 50% of GDP assuming, in the presence of much conflicting evidence, zero net factor bias from, for example, Green Revolution biological and mechanical improvements; b) LABOR—Urban migration continues to absorb natural growth, to which is added the migration of peasants displaced by the land enclosure associated with new methods, and from which is subtracted the jobs now generated by new economic growth, leaving a net population assumed to be of constant size and wage; c) CAPITAL—Foreign loans flow in at equivalent of 5% of GDP p. a. with interest and loan repayments rising to meet this inflow; leakages depress KMP such that net resource transfer falls from +5% p. a., turning negative after about 10 years (Todaro, 419); KMP very low, 0.15, as a result of leakages and inappropriate investment; illegal leakages can be high, e.g. the misappropriation of 50% of the 1972 Nicaragua earthquake reconstruction loan;

no domestic savings assumed; d) GDP—Rising slowly; e) GINI—High and rising as a result of loan leakages and allocating criteria favoring those with collateral.

In the INFORMAL SECTOR the following holds, Growing, otherwise unchanged.

In the URBAN SECTOR the following holds: a) LAND—Unchanged; b) LABOR—Growth now 1% p. a. due to government population policies; wages unchanged due to capital intensity of loan projects; c) CAPITAL—As for rural sector; also domestic savings assumed to drop from 5% to zero due to additional leakage from capital flight, equivalent to half the total debt of some Latin American debtor nations (Todaro, 403); inappropriate investment includes real estate speculation and prestige "white elephant" projects; d) GDP—Rising, then falling if foreign debt fully serviced; e) GINI—As for rural sector.

THE FOREIGN DIRECT INVESTMENT (FDI) STRATEGY. From the variety of asset and contractual bases of FDI the enclave model is chosen for simulation. Capital intensive extractive and export oriented projects are assumed, capital and production being virtually external, but with internal impacts upon distribution and divergence.

In the RURAL SECTOR the following holds: a) LAND—Being enclosed at, say, 2% p. a. to accommodate FDI, Enclave site rent enhanced by FDI, but no estimate made; b) LABOR—Migration of surplus now includes those displaced by enclosure (2% p. a. natural + say 1% p. a. displaced), wages remain at subsistence; c) CAPITAL—Imported and irrelevant, but taxation of FDI creates small source of domestic capital investment, again subject to leakage, and of low (0.15) KMP; d) GDP—Reduced by enclosure, increased by FDI taxation; e) GINI—High, rising depending on enclave rent agreements.

In the INFORMAL SECTOR the following holds: Migration now 3% of rural population p. a.

In the URBAN SECTOR the following holds: a) LAND—Rent increased by enclave capital investments; b) LABOR—Increase now 1% p. a., wages unchanged due to capital intensity of FDI projects; c) CAPITAL—Enclave capital irrelevant, except for the small tax revenue it supplies to the urban sector; d) GDP—Rising with population, and from tax if invested; e) GINI—High, increasing slowly.

REFORMIST AND REDISTRIBUTIVE STRATEGIES. These failures (of land redistribution, collectivization, tenancy reform, ceilings on rents and land holdings, floors on wages, taxation of incomes and assets of low visibility) have been summarized earlier, but, at the present time, inadequately parameterized for simulation.

THE SITE REVENUE STRATEGY. This strategy requires no external source of savings, all domestic saving coming from collection of site revenues of 50% of rural GDP and 10% of urban GDP. Political questions of compensation and implementation time scales are not treated in this model.

In the RURAL SECTOR the following holds: a) LAND—Quantity increased as unused and underused land taxed back into production, rent now collected as revenue; b) LABOR—Natural increase reduced by rising standard of living to 1% (possibly zero later), wages rise with GDP thus halting migration; c) CAPITAL—Natural development of labor-intensive light industry, small scale and large scale farming, according to comparative advantages perceived by markets instead of by domestic institutions and foreign development agencies, new incentives plus rational resource allocation raises KMP to 0.3; d) GDP—Rising rapidly from large investments; e) GINI—Falls to zero (theoretically) then rises slowly.

In the INFORMAL SECTOR the following holds: a) LAND—Irrelevant; b) LABOR—Migration halted, natural increase of 1% assumed.

In the URBAN SECTOR the following holds: a) LAND—Quantity increased as unused and underused land taxed back into production, rent now collected as revenue; b) LABOR—Natural increase 1% falling, wages up with GDP; c) CAPITAL—Rising rapidly with investment, KMP 0.3; d) GDP—Rising rapidly with investment and new incentives; e) GINI—Falls to zero (theoretically) then rises slowly.

Adolph Lowe (Continued from p. 112)

State. Lowe was one of the first 20th century economists to take up the challenge of the 19th century economist, Henry George, to make the promotion of economic development a means of sharing the gains of technological progress with the common man. Several of his books, particularly *The Path of Economic Growth,* occasioned a number of colloquia among scholars. A less technical one was *Has Freedom a Future?*

As Lowe's student, Professor Robert L. Heilbroner, wrote in bestowing one of Adolph's many awards from German as well as American scholars, the Veblen-Commons Award, it is uncertain whether the future will vindicate Lowe's hopes but "Lowe's vision is a guide to informed action" from "a man who seeks to help mankind achieve as much freedom as its understanding will permit."

The editors of this Journal offer their sincere condolences to Professor Lowe's survivors, his devoted daughters and their families. Deeply, we share their loss.

WILL LISSNER