RURAL POVERTY AND DEVELOPMENT POLICY IN PAKISTAN: The Case of a Resilient Income Distribution System

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Abstract

This paper attempts to explain the causes of widespread rural poverty which has persisted in Pakistan in spite of the development effort. The paper also analyses the various rural development policies implemented and explains why these policies have had little if any impact on the incomes of the rural poor.

The main instrument of analysis of the study is a system dynamics model incorporating income generation and disbursement processes in an agrarian economy consisting of a capitalist sector and a self-employed sector. The analysis takes into account only the economic factors arising out of the rational decisions of the capitalists and the cultivators. These factors are considered adequate for maintaining rural poverty, although, the role of social and political factors is acknowledged.

The study suggests that the absence of an economic force that should encourage ownership of land by its cultivators is a key factor responsible for the poor economic condition of the working rural households. Land is easily separated from cultivators and is concentrated in the capitalist sector. This concentration significantly reduces income in self-employment and thus leaves the cultivators with very little bargaining power for negotiating compensation for labor. Thus, development policies striving to increase productivity may only serve to increase the claim to income on the basis of ownership of resources. If ownership is concentrated outside of the cultivators, such policies may worsen economic condition of the cultivators.

The study proposes a general framework for rural development incorporating simultaneously fiscal instruments that should encourage transfer of land ownership to its cultivators and policies that should help increase productivity of land.

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1. INTRODUCTION

Rural poverty in the developing countries has lately received much attention in the literature of economic development. Several country specific and general studies are available on the subject. Notable among these are writings by Lipton: 1976, Galbraith: 1979, Haq: 1976, and Griffin: 1978. These writings attribute poverty, in varying degrees, to paucity of resources, frequent natural calamities, social and technological backwardness, exploitation of the rural poor by the rich, dependencies between the urban and rural sectors and between nations, and even to malnutrition and genetic stupidity of the poor. Unfortunately, most of the treatises on the subject are rhetorical and make little if any attempt to explain systematically the mechanisms responsible for creating and maintaining conditions of mass poverty.

This paper attempts to explain the causes of rural poverty in terms of the feedbacks underlying the resource allocation and income distribution processes of the rural economic system. Pakistan is used as a case study to provide empirical validation for the feedback model presented. The paper also analyses the various rural development policies implemented, and explains why these policies have had little, if any, impact on the incomes of the rural

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poor.

A system dynamics model embodying the micro-economic relationships that govern decisions to acquire production factors, to produce, and to disburse income to its various claimants is developed as the main instrument of analysis. The technical details of this model are discussed elsewhere (Saeed: 1980; Saeed: 1981). This paper delineates the structure and the hierarchy of the income and resource streams of the model and describes the key decisions endogeneous to the income distribution system affecting those streams. Additionally, the paper examines macro-policies that underlie most development programs and discusses their effect on income distribution.

It is suggested that the conditions of persisting poverty arise out of the absence of an economic force that should act against the separation of the means of production from the cultivators. The absence of this force also makes income distribution resilient to most development policy instruments and this assures persistance of poverty.

While the importance of social, cultural, and political factors in affecting incomes of the various cross-sections of rural house-holds is acknowledged, only economic factors are used in this study, as these factors are considered adequate for creating and maintaining the rural poverty.

2. RURAL POVERTY AS AN INCOME DISTRIBUTION PROBLEM

The majority of rural households in Pakistan receive incomes that are much lower than what is reflected in per capita income figures (Griffin: 1979). Per capita income has been quite low by western standards, but it has been rising steadily both in real and money terms over the past three decades (Pakistan Economic Survey: 1977-78). However, poor households have experienced little change in their standard of living which has declined in some cases (Griffin: 1979). This has happened in spite of the several rural

development policies specifically aimed at the poor. Apparently, no dent can be made in the poverty problem by stimulating production unless the mechanisms of income distribution are concomitantly influenced. Therefore, the focus of this analysis is income distribution.

The pattern of rural income distribution in Pakistan is characterized by wide disparities in income between the capitalist and the cultivator classes, whereas, within each class the members enjoy relatively uniform incomes and life styles. The capitalist class consists of absentee landlords who rent out their land to the share-croppers, and commercial farmers who employ wage labor to cultivate their land. The cultivator class consists of self-employed peasants tilling their own land and/or share-cropping on rented land, and wage-workers (Alavi: 1976).

Based on the size of land owned and the pattern of farm management according to farm size in the 1950s, it can be easily shown that the capitalist households constituted about 3% of the rural households in the early part of that decade. However, they owned about 70% of the land and obtained about 50% of the rural income. The remaining 97% of the households consisted of the cultivators who owned 30% of the land and shared about 50% of the rural income among themselves (Saeed: 1980).

Since the 1950s, a number of development programs have been implemented in Pakistan. Most of these programs can be placed in the framework of a small number of macro-policies that have a mixed set of economic and social objectives. The policies with economic objectives include the provision of mechanical implements, green revolution inputs, institutional credit, and industrialization of the urban sector (Stern: 1970). The policies with social objectives include land reforms, community development efforts, and family planning. The policies with economic objectives have apparently helped to increase significantly the land productivity and agricultural

output, although, the incomes of the poor are unaffected. Social reforms have usually been introduced on a limited scale and have had little effect on the incomes of the poor (Papenak: 1977).

3. HISTORICAL TENDENCY OF THE INCOME DISTRIBUTION SYSTEM

"Historical tendency" is used as a reference condition for testing the hypotheses advanced in this study as against "historical behavior" because of the lack of data providing a substantive basis for measuring historical behavior. The historical tendency serving as reference mode is abstracted from various pieces of historical evidence. This tendency encompasses the aspects of history which determine the shares of the various claimants to rural income. These aspects are land ownership, land management, and worker compensation.

Prior to the nineteenth century, agricultural land ownership rights did not exist in the region, which is now Pakistan. All farming was carried out by self-employed cultivators who traditionally lived on the land they tilled. The size of a land tract often depended on the size of the family cultivating it and the produce of the land was claimed by its cultivators after a share representing land revenue was given to the representatives of the ruler (Roulet: 1976).

In the 1900s, a new land tenure system was introduced by the colonial British government. Under this system, land ownership rights were formalized and land could be bought, sold, mortgaged, and rented like any other commodity. Simultaneously, marginal lands were irrigated and large land tracts were granted to the subjects of the crown as well as to prospective commercial farmers (Roulet: 1976).

Over the period that followed, not only did commercial farming gradually disappear but the cultivators also lost most of their land holdings

to the big, and often absentee, land-owners. Share-cropping emerged as the dominant land management practice, while land rents rose and worker compensation declined. Thus, over the course of these changes, the economic condition of the cultivators continuously deteriorated. These changes eventually led to the stagnant pattern of land ownership, land management, and income distribution that was prevalent in the 1950s (Roulet: 1976).

A significant effect of the rural development programs introduced after the 1950s was a change in the land management pattern. Over this period, commercial farming became quite popular and a large part of the share-cropped land was converted by its owners to commercial farms (Alavi: 1976). This change is reported to have also further decreased the cultivator land holdings and depressed worker compensation (Burki: 1976).

4. STRUCTURE OF THE RURAL INCOME DISTRIBUTION SYSTEM

Ownership of land and farm capital and labor input into the production process are the bases of claim to the farm income. However, the income shares of the various claimants are determined not on the basis of the productivity of the factors contributed by the claimants but by their respective bargaining positions (Bardhan:1973; Anderson: 1968). Although, in the long run, the factor proportions are adjusted in such a way that the marginal revenue product of the factors equals their respective wages. Thus, even though a correlation may appear between factor productivity and factor wage, the causal relations between the two are far more complex. This is an important premise for understanding the income distribution system. The mechanisms of bargaining and the feedbacks these create will be discussed later in this paper.

The prevalent patterns of farm management indicate that the agrarian economy is distinctly dualist, i. e., consisting of a worker-hiring and/or

land-leasing capitalist sector, and a self-employed peasant sector. Furthermore, all workers, whether self-employed in tilling their own or rented land or employed as wage-workers, belong to a homogeneous socio-economic group. This group has a common interest — to maximize its consumption. This group is also the sole supplier of labor in the economy. On the other hand, the capitalist sector strives to maximize profit while it is also the sole wage-employer in the economy (Bardhan: 1973).

As the tenure system protects the ownership rights of farmers and absentee landlords alike while it also warrants easy and uncumbersome land transactions, production resources may be owned by one sector and employed by the other. Ownership of resources by a sector depends on its financial ability, while the amount of resources employed by a sector depends on its production efficiency. Figure 1 illustrates the broad accumulation processes and the rates of change related to the allocation of land between the sectors for ownership and for farming.

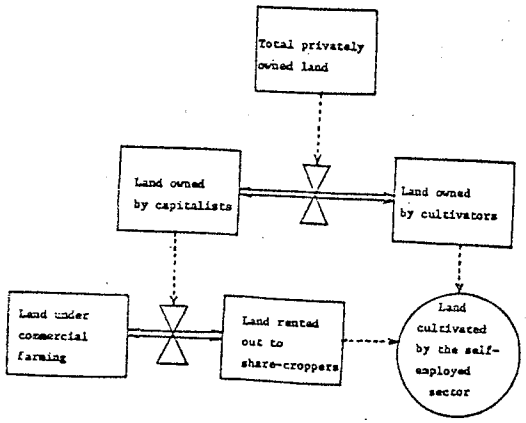


Figure 1: Allocation of Land Between Sectors

The total land available for cultivation is divided between the capitalist and the self-employed sectors. The land owned by each sector changes as the two sectors buy and sell land between them. Land in the capitalist sector is either commercially farmed or rented according to which is more profitable. Land farmed by the self-employed sector consists of land owned by the workers as well as land rented from the capitalist sector.

Capital is allocated between the sectors in the same way as land. However, traditional capital can be created on farm by diverting some of the production capacity to producing it, whereas, modern capital is imported from the industrial sector. Each type of capital is available to the two sectors as shown in Figure 2 and is acquired by the two sectors depending on their utility for capital and their financial resources.

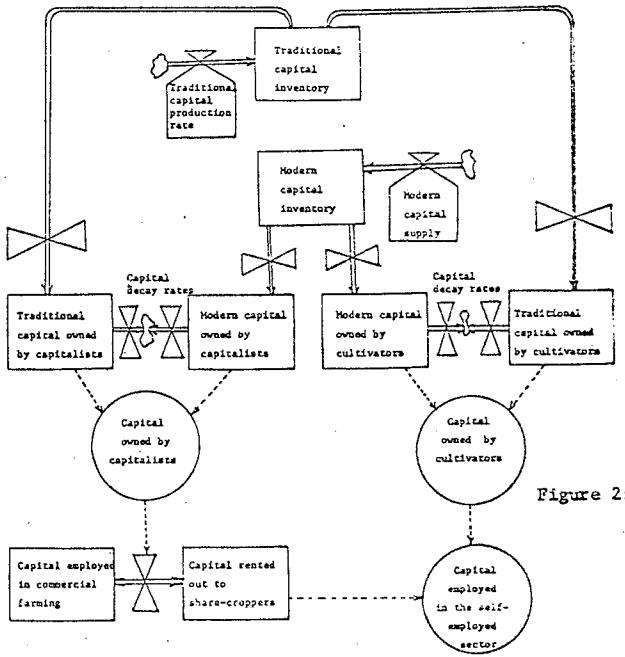


Figure 2: Allocation of Capital Between Sectors

The rural workforce is divided between wage-employment and self-employment sectors as shown in Figure 3. The capitalist sector hires as many workers as it needs at a wage determined by the collective bargaining position of the workers. The remaining workers are accommodated in the peasant sector.

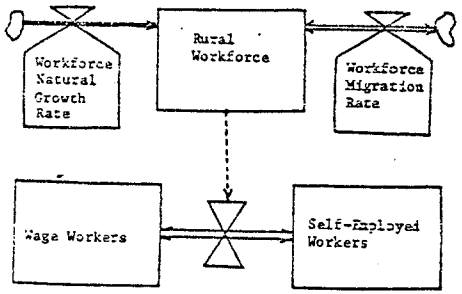


Figure 3: Allocation of Workers Between Sectors

Figure 4 shows how capitalist and worker shares of income are determined. A part of the value of production of the capitalist sector is paid out as wages, the rest is added to the revenue of the sector. The other component of the revenue of the capitalist sector is rent payments received from the self-employed sector for the production factors rented out to it. A part of the production of the self-employed sector is disbursed as these rent payments. The rest is added to the revenue of the workers. Wage payments received from the capitalist sector for labor provided also add to the revenue of the workers.

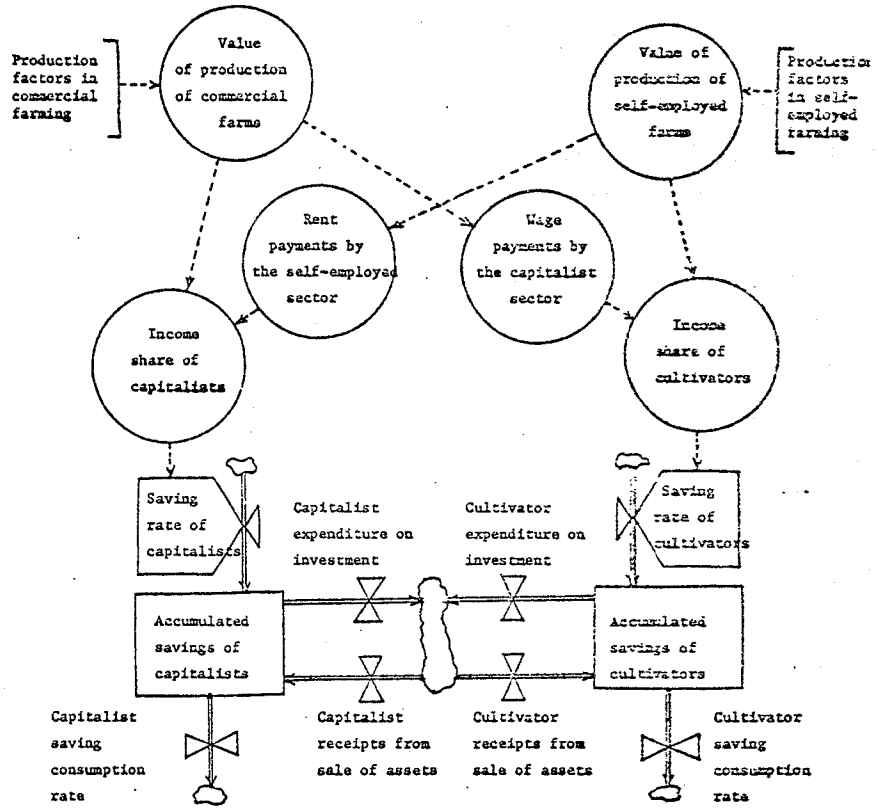


Figure 4: Disbursement of Rural Income

A part of the income in both sectors is consumed. The unconsumed parts of the incomes are saved and flow into the respective accumulated savings. Accumulated savings are spent by each sector on the acquisition of land and capital, or are eventually consumed. When any assets are liquidated by a sector, funds equal to the money value of the liquidated assets flow into the accumulated savings. Thus, as land is bought and sold between the sectors, savings representing the money value of the transacted assets are at the same time transferred between them. The value of farm capital produced by a sector is included in the value of its production. Thus, for accounting purposes, when a sector invests in farm capital, whether this capital is acquired from the indiginous sources or from the industrial sector, the money value of the acquired capital flows out of that sector's accumulated savings.

The resource and income streams of the rural economy discussed in this section are governed by the feedbacks arising out of the economic decisions of the two sectors. These feedbacks are responsible for a tendency of the income distribution system to move towards an internally determined goal which assures low incomes for the cultivators. Key feedback mechanisms in the system are discussed in the next section.

5. KEY MECHANISMS UNDERLYING PRODUCTION AND INCOME DISTRIBUTION DECISIONS

At the outset, the resource and income streams discussed in Section 4 may be assumed to be governed by the mechanisms of a perfect market in which both capitalist and self-employed sectors are price-takers and are perfectly competitive. Further, the simplifying assumptions of homogeneous technology [illegible]tput, fixed economy, and employment of all resources available to each s[illegible]r are made. These assumptions also impose on the model the following un[illegible]listic restrictions:

1. All production factors including labor are paid according to their respective marginal revenue products averaged over the whole of the economy.

2. The issue of ownership of resources is not clear. In default, the resources employed by a sector can be assumed to be owned by it. Renting of resources, therefore, is irrelevant.

3. As resources easily flow towards the sector where these can be efficiently employed, the financial markets are perfect, and the investment ability of a sector is independent of its saving ability.

4. For accounting purposes, the savings of a sector should in the long run equal its investment. Therefore, the saving habits of both sectors must be similar and stable, i. e., the marginal propensity to save in each case is the same and, for simplification, fixed.

Thus, in view of the structure of the dual economy descibed in section 4, only one feature differs in the resource allocation decisions of the two sectors: While the capitalist sector adjusts the number of workers employed by it on the basis of their cost relative to their benefit, the peasant sector absorbs all residual workers after the capitalist sector has met its worker needs.

A system Dynamics model of the income distribution processes in a dualist rural economy embodying the above assumptions was formulated. The resources were arbitrarily equally distributed between the two sectors and the model was initialized in a state of "market equilibrium," which persisted when the model was simulated.

Next, the equilibrium was disturbed by taking away a fraction of the workers from the capitalist sector and placing them in the self-employed sector and the model was again simulated. The transfer raised the marginal productivity of workers in the capitalist sector which immediately proceeded to increase its workforce. The transfer also increased the intensity of cultivation in the self-employed sector, as a result of which the marginal productivities of land and capital in that sector rose; hence it proceeded to acquire more land and capital. Worker hiring by the capitalist sector and land and capital acquisition by the self-employed sector continued until

marginal revenue products of factors and their proportions were the same in both sectors.

Figure 5 illustrates how the two sectors proceeded in the simulation to equalize proportions and the marginal revenue products of factors in response to the exogenous transfer of workers. It may, however, be noted that the new equilibrium manifests a different distribution of land and workers between sectors than that of the original equilibrium. This should be expected, as both sectors are concerned with maintaining efficient factor proportions and are not committed to having an absolute amount of any one factor. Also, as long as wage rate is based on the aggregate marginal revenue product of workers, the equilibrium proportion of workers with respect to other factors will be the same in both sectors, even though the peasant sector does not have any hiring or firing ability. The tendency of the capitalist sector to equate marginal productivity of workers to their wage rate assures that the worker intensity in both sectors is the same.

The income share of the workers is not adversely affected by the arbitrary transfer of workers to the self-employed sector. The loss in wages of the workers is adequately compensated for by increases in production of the self-employed sector when it acquires additional resources. The average consumption per worker suffers when wage income is lost, but recovers to a higher level as the workers start receiving additional income from the newly acquired resources.

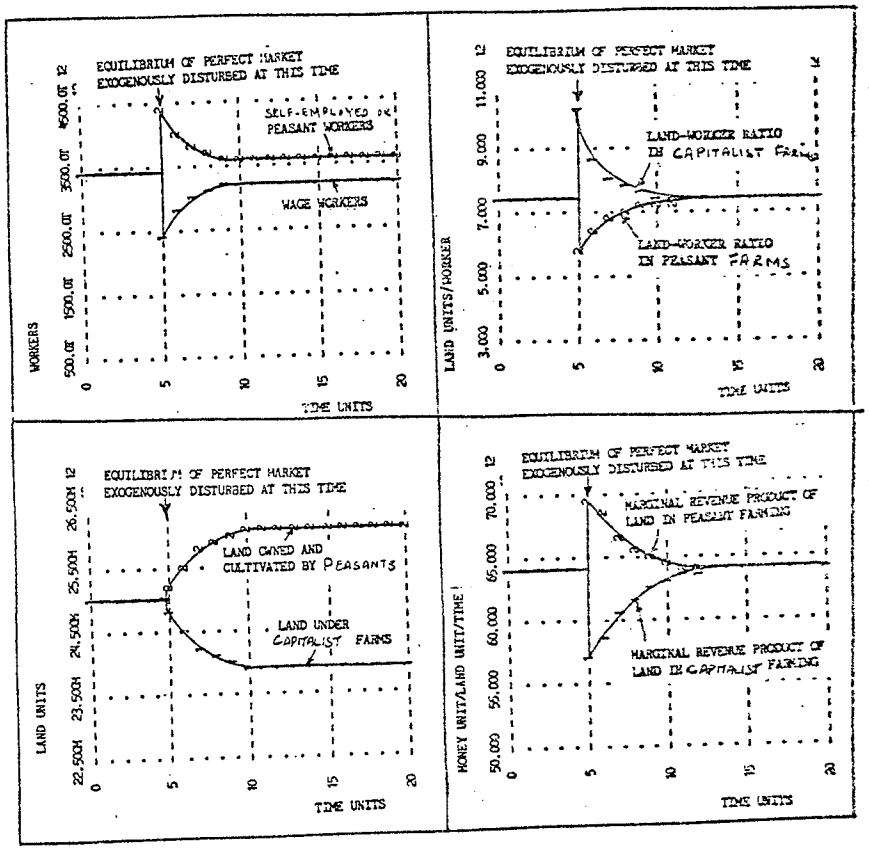


Figure 5: Recovery from Disequilibrium in a Dual Economy With Perfect Market Assumptions

The behavior of the model incorporating assumptions of perfect market is quite consistent with what is manifested in the neo-classical economic literature, although this behavior is empirically invalid. Evidently, the unrealistic limitations stated at the outset contradict what takes place in the real world. The suppliers of the production factors are paid according to their respective bargaining positions and not on the basis of the productivities of the production factors they supply. A formal framework of ownership of land and capital exists and is protected by law in most non-socialist countries including Pakistan. Both land and capital can be freely bought, sold, mortgaged and rented by their owners. Often, production resources are owned by one sector and employed by the other, while rural financial markets are invariably segmented where all economic units are confined to self-finance and a complementarity exists between the saving ability of a household and its investment ability (Mckinnon: 1973). Furthermore, the saving patterns of the capitalist and the cultivator households differ widely. The former, having incomes much above subsistance, show stable saving propensities. The saving propensity of the latter is very sensitive to the availability of wage employment opportunities that decrease the need to save for supporting investment for self-employment, and to decreases in the absolute level of their income in the face of inflexible subsistence consumption that limits their saving rate even when investment for self-employment is necessary (Mellor: 1969).

The implications of relaxing each of the above limitations of the model are discussed in detail in Saeed: 1980, and Saeed: 1981. It suffices here to say that these limitations must be relaxed en-bloc to achieve consistency between the structure of the income distribution system and the model. If these limitations are relaxed, the model shows the income distribution tendency which is shown in the historical evidence. The

following changes in the structure of the model are necessary before it can faithfully represent the system, both in terms of its structure and its behavior:

1. Worker compensation should be determined on the basis of the worker's collective bargaining position. A proxy for this is the opportunity cost of workers for supplying one unit of labor to the capitalist sector. This opportunity cost is represented by the average level of consumption available to all workers (both self-employed and wage-employed) before a unit of wage-labor is supplied.

2. The capitalist sector may rent out land and capital to the self-employed sector if it is uneconomical for the former to directly employ those resources. Thus, ownership of production factors may not necessarily rest with the sector employing those.

3. Investment ability of a sector should depend not only on its ability to employ resources efficiently, but also on its saved cash balances. Absence of savings may force liquidation of assets in order to meet maintenance investment and lumpy consumption needs even when the marginal returns on those assets are higher than their marginal costs.

4. The workers must increase their rate of consumption when their utility of saving for maintaining resources for self-employment is low. This can occur when wage-employment opportunities offering compensation equivalent to the average consumption level of workers are available. These opportunities allow transfer of some of the self-employed workers to wage-work and permit consumption of savings previously required for maintaining resources for self-employment.

When wage employment is not available, the absolute income of the self-employed workers is limited if they have to pay rent for the resources they engage. Consumption patterns being inelastic at low levels of income, this also limits their savings.

Incorporating the above propositions in the model imparts to it an internal tendency that closely resembles the historical behavior of Pakistan's rural income distribution system. Furthermore, the income distribution goal of the model is independent of its initial conditions as illustrated in Figure 6, which compares the land ownership behavior of the model with different initial conditions.

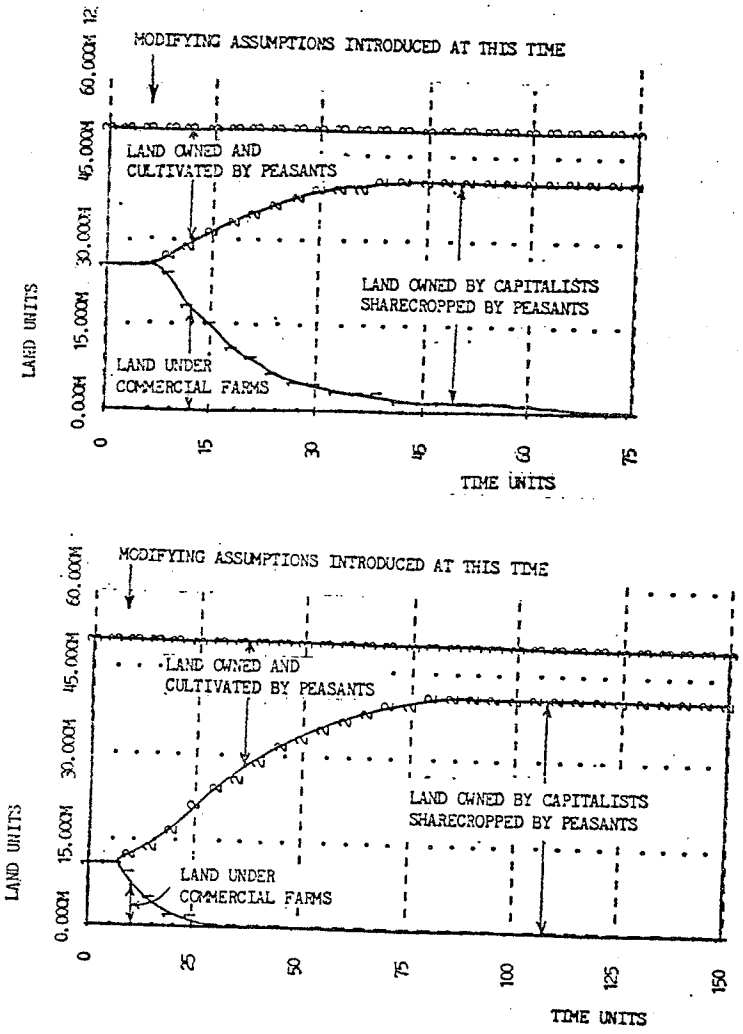


Figure 6: Internal Tendency for Land Distribution of the Complete Model, Various Initial Conditions

In both cases shown, the model was in equilibrium with perfect market assumptions before its modifying assumptions were activated. The model strives to reach a new equilibrium which is the same irrespective of the initial equilibrium. The equilibrium goal of the model shows that most of the land is owned by the capitalist sector, that commercial farming is almost eliminated, and that share-cropping emerges as the leading land management practice. Figure 7 shows the end equilibrium income shares of capitalists and workers. Even when the capitalist sector's share of income is small initially, towards the end about 50% of the income falls to that sector. Capitalist households, being a very small fraction of the total households, worker compensation equilibrates at a low level.

The income distribution system modeled exhibits an internal tendency toward separation of means of production from the workers. Ownership of resources tends to concentrate in the sector with a stable saving ability while ownership does not bind this sector to cultivate the land, which is rented out to the self-employed sector.

When the wage rate or in the case of self-employment, the claim to income on the basis of labor input is determined independently of land ownership, the separation of ownership from cultivators may not necessarily lead to a reduction in worker compensation. However, when income is divided between its claimants through mutual agreement, the share obtained by each is strongly influenced by the collective bargaining position of the claimants. If a worker can afford a high level of consumption by being self-employed on a family farm, his opportunity cost of becoming a wage-worker will be high. When self-employed workers own little land and mostly share-crop, not only is their share of income claimed on the basis of ownership small, but the level of consumption available to them, and consequently, their opportunity cost of becoming wage-workers, are also low. Thus, the concentration of land

ownership in the capitalist sector undermines the collective bargaining position of the cultivators and causes worker compensation to decline.

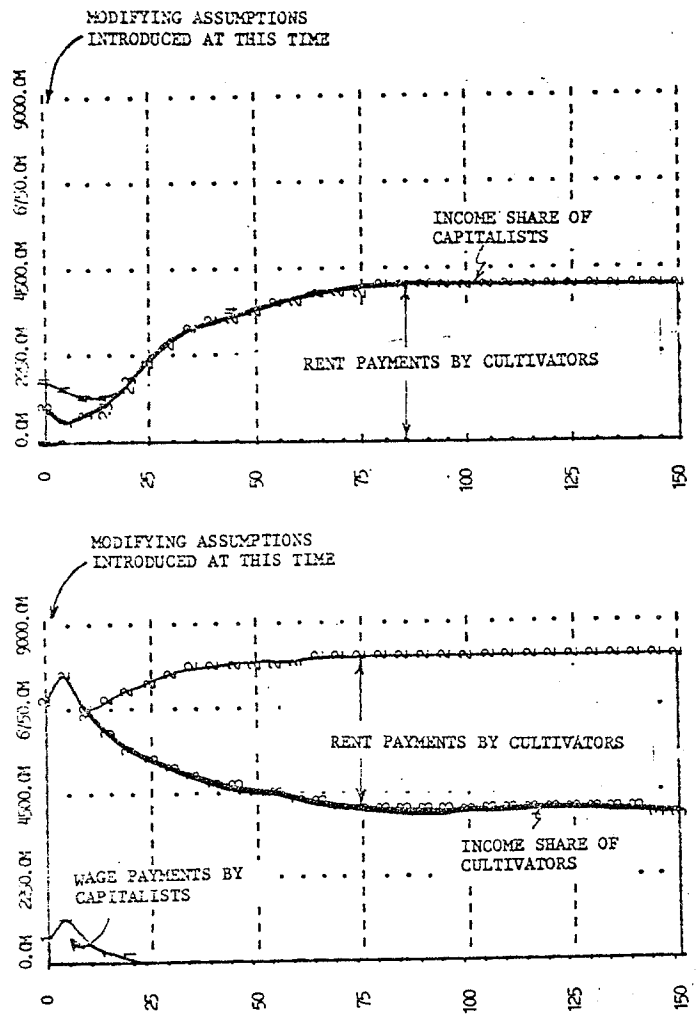


Figure 7: Internal Tendency for Income Distribution of the Complete Model

It should be interesting to note here that the model behavior exhibits a high positive correlation between wage rate and the marginal revenue product of workers (see Figure 8) that is in agreement with the economic belief that production factors are paid according to their incremental contribution to production. However, the model does not incorporate in its structure a corresponding set of correlations.

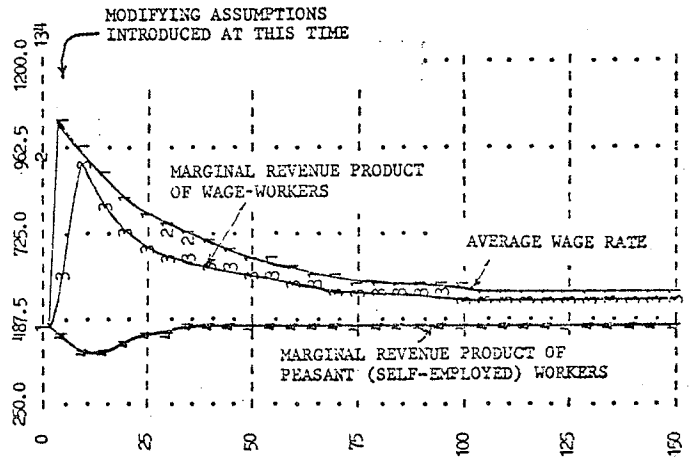


Figure 8: Wage Rate and Marginal Revenue Product of Workers

Figure 9 represents a much simplified causal diagram showing important negative feedbacks affecting wage rate and marginal productivity of wage workers. Wage rate, being a function of the bargaining position of the workers, depends on how much of the resources are owned by the workers. Because the savings and investment abilities of the parties are complementary, the ownership of resources by workers is positively affected by their own saving ability while it is negatively affected by the saving ability of the capitalist sector. Everything else remaining unchanged, worker saving ability will be negatively affected by the number of workers being accommodated in self-employment as they would increase consumption pressure. The number of self-employed workers increases when fewer wage-workers are hired by the capitalist sector, whereas, the decision to hire workers depends on the wage rate. The saving and ownership ability of the capitalist sector depends on the volume of its profits. These profits are positively related to the productivity of the wage workers, which is negatively related to the number of wage workers and this number depends on the wage rate.

Another negative feedback loop affecting the wage rate arises out of the consumption-maximizing behavior of the workers. When the wage rate is high, the self-employed sector would encourage some of its members to accept wage employment, so that it becomes possible to expand consumption by not having to save for supporting self-employment facilities for these workers. In the long run, however, the diminished saving rate decreases ownership ability of the workers, and this suppresses their bargaining ability and, thus, the wage rate.

A further examination of Figure 9 reveals that, in terms of causations, wage-worker productivity negatively affects the wage rate while the wage rate positively affects wage worker productivity. The two would eventually move towards the same goal and might have a positive correlation

but this correlation is not guaranteed by the structural relationships between them.

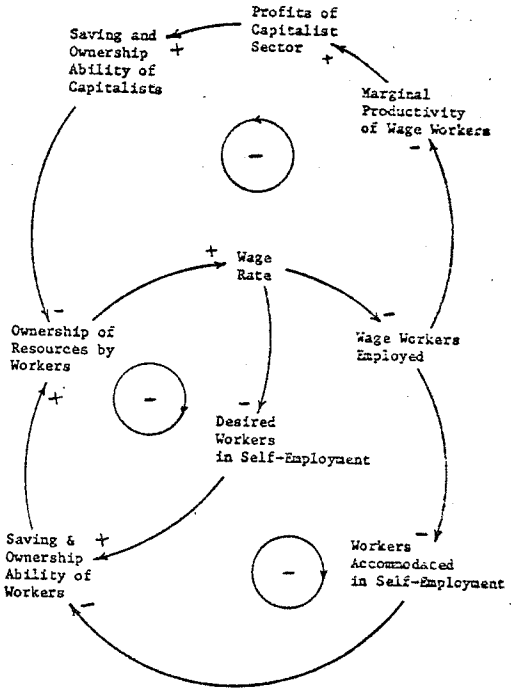


Figure 9: Simplified Causal Diagram Showing Negative Feedbacks Affecting Worker Compensation and Income Distribution

When both capitalist and self-employed sectors use the same technology, and the opportunity cost of capital investment is uniform everywhere, the marginal revenue product of workers must become the same in the two sectors. However, as wage rate depends on the total income claimed by the workers less their cost of investment in self-employment, the wage rate cannot become equal to the marginal productivity of workers unless the worker's claim to income is primarily due to their labor input. Thus, if the capitalist sector is to exist at all, a high degree of dichotomy must arise between the owners and the cultivators of resources. The existence of the capitalist sector is assured because it is possible to practice share-cropping that allows capitalist households to obtain a profitable return on land owned by them without having to hire wage-workers for cultivating it. Thus, low worker compensation with accompanying accumulation of income in the capitalist households is assured.

There are also several positive feedbacks in the system coupled with the negative feedbacks described above. These feedbacks further facilitate separation of the means of production from the workers. Figure 10 shows the key positive feedbacks. These feedbacks arise out of the strong coupling between the two sectors in terms of sharing resources and income, and from the zero sum nature of the economy. Rent payments by cultivators strengthen the financial ability of the capitalist sector, but weaken that of the cultivators. Since financial ability affects the ability to own land, the sector with increasing saving ability will end up owning the most land. Furthermore, as ability to own land in the peasant sector decreases, land rents are bid up, which further increases rent payments while also encouraging the capitalist sector to rent out more land. Thus, separation of land from the cultivators is speeded up.

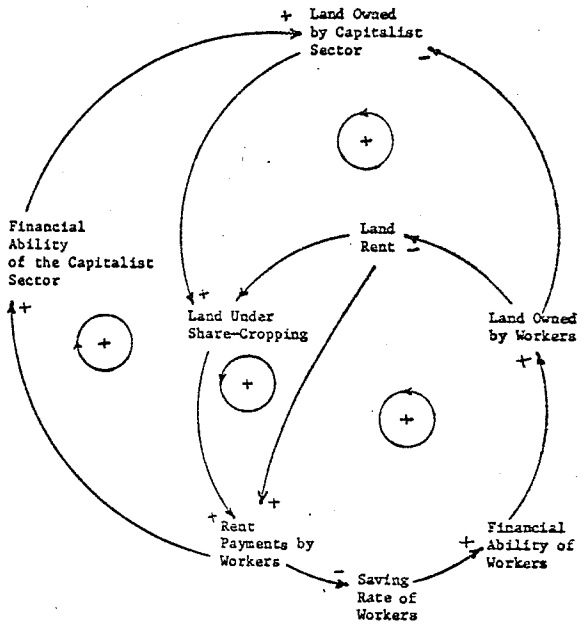


Figure 10: Simplified Causal Diagram Showing Positive Feedbacks Affecting Worker Compensation and Income Distribution

Population growth in such an economy will worsen income distribution and further suppress worker compensation even though the accompanying increase in workforce raises the intensity of cultivation and total output. As increased intensitiy of cultivation increases productivities of land and capital, rents are bid up. Consequently, the capitalist sector's share of the total rural income absorbs a substantial part of the increase in output, while the remaining output has to be divided between an increasing number of workers. Therefore, the average consumption level of workers and their wage-bargaining position declines. Thus, the burden of population increase is largely borne by the workers.

The behavior of the model quite accurately represents the internal tendency of Pakistan's rural income distribution system while the micro-structure of the model also embodies the typical charateristics of the system. Furthermore, the qualitative behavior of the model is quite insensitive to changes in its parameters which appear to affect largely the speed of adjustment of the system. Details of the model parameters and their sensitivity are described in Saeed: 1980. Further discussion will be aimed at studying implications of the various development policies, past and exploratory, with a view to further increasing understanding of the nature of the forces responsible for making the income distribution system resilient to policy changes, and to identifying the effective ways of countering those force.

6. RURAL POVERTY AND DEVELOPMENT POLICY

The emphasis of the development policy in Pakistan has varied over the past few decades. During the 1950s, industrialization was promoted almost exclusively (Falcon & Stern: 1971) In the mid-fifties and early sixties extension services in the rural areas were also introduced (Mizrow: 1963). In

the mid-sixties and seventies, agricultural modernization, rural credit, and promotion of agricultural cooperatives were pushed as key policy instruments (Khan: 1976). Some effort was also made at redistributing land through the land reform acts of 1958 and 1971. Industrialization was expected to absorb the surplus rural labor in addition to causing an increase in the aggregate income. Rural extension service programs attempted to help farmers by making available to them agricultural technicians. Agricultural development programs were aimed at increasing the income of the rural population. Land reform represented explicit efforts to redistribute rural income.

The industrial development programs attracted quite a large number of rural migrants as a result of which the rate of urbanization has been quite high over the past few decades (Pakistan: Basic Facts, 1977-78). The rural extension service programs were run for several years on an experimental basis and then discontinued as these were considered ineffective (Mizrow: 1963). The agriculture-related programs have been credited with bringing about a "green revolution" experienced in the 1960s (Nutley: 1972) while the scale of the land reforms was trivial (Haider: 1975). In any case, most observers agree that no dent has been made in the problem of rural poverty.

In an income distribution system, where land ownership not only entitles a party to a share of income but also determines the level of compensation for the labor input to production, any development programs aimed primarily at increasing productivity and aggregate income may only increase the income shares of the parties owning most of the productive resources. Additionally, the dependence of investment on internal savings allows parties with rising incomes to expand their ownership further. Thus, growth-oriented development programs not providing for land redistribution may worsen rural income distribution and draw down compensation of the rural worker. This has been amply demonstrated by the outcome of the development programs in

Pakistan. The key macro-policies implemented and their implications are discussed below:

6.1 Modernising Agriculture

There have been numerous arguments about the scale of technology which has been applied to modernizing agriculture. While large-scale technologies give economies of scale, the small farmer can often not use these and as such productivity of small farms cannot be enhanced. Thus, divisibility of technologies has lately been emphasized. However, this debate appears irrelevant to the poverty issue when viewed in the context of the dynamics of income distribution. Figure 11 compares two simulation runs showing changes in land ownership and land management patterns in response to the introduction of large and small scale modernizing technologies. The simulation in Figure 11(a) assumes that the technology is large scale and available only to the capitalist sector. Thus, it introduces a high degree of capital differentiation between the two sectors. Simulation in Figure 11(b) assumes that the technology is divisible or the small farms are organized into cooperatives and thus can use large scale technologies. This translates into having a low degree of capital differentiation between the two sectors. In both cases, it is assumed that application of modernizing technology will increase the output elasticity of capital while simultaneously decreasing the output elasticity of labor. Furthermore, this application is assumed to make the sowing and harvesting processes faster, thus permitting multiple cropping which increases yearly production in proportion to the intensity of application. The technological inputs are available in small quantities and are rationed between the two sectors according to their respective demands. Finally, to assure a high degree of access to the technological inputs for the small scale farming sector, financial constraints on investment are reduced, which can be translated into provision of institutional credit to the farmers.

The initial condition parameters for these simulations are comparable to the corresponding conditions in Pakistan in the 1950s. Additionally, a fixed population growth rate of about 2% per year is assumed.

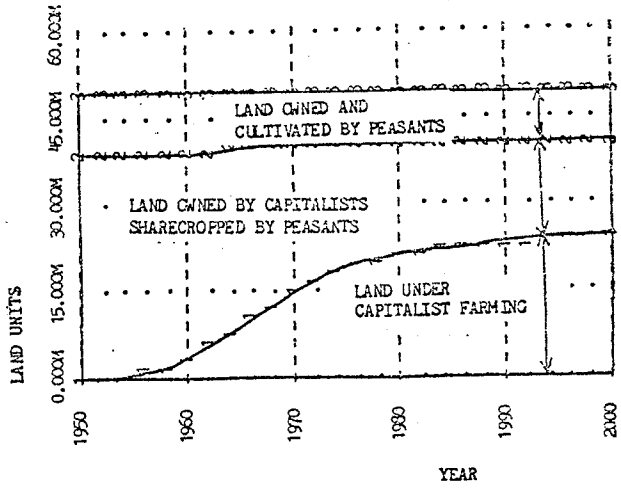


Figure 11(a): Large Scale Technological Inputs Available Only to Capitalist Sector

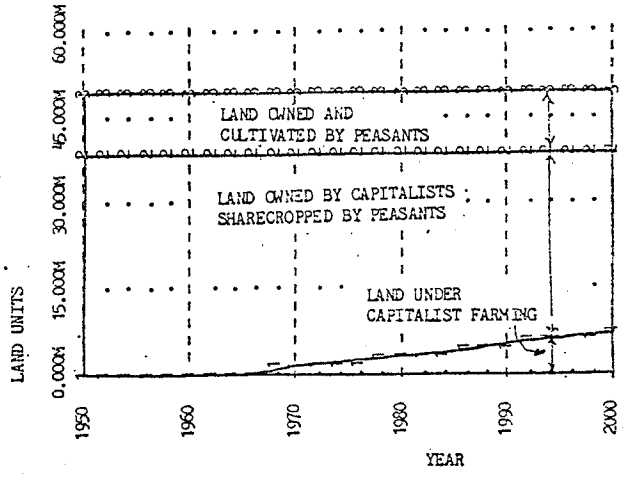


Figure 11(b): Technological Inputs Available to Both Sectors

Figure 11: Modernizing Agriculture: Land Ownership and Land Management Patterns

The two simulation runs exhibit more or less similar land ownership patterns, although different land management patterns. When the application of technology produces high capital differentiation, a rapid increase in capitalist farming is shown, whereas, when technology produces low capital differentiation, share-cropping continues to be the dominant land management practice. In the first case, capitalist farming expands because the productivity of land where modern inputs are applied is higher than the land rent available in share-cropping. However, the conversion of share-cropped land into capitalist-farmed land displaces more self-employed labor than the wage-labor it employs. Consequently, the shortage of rentable land pushes up land rents. Also, as the self-employed sector absorbs the surplus labor in the economy, its cultivation intensity increases, which raises its productivity to the level of commercial farms. At this point, the conversion of share-cropped land to commercial farms stops.

When modernizing technology is almost equally available to both sectors and the capital differentiation between the two is small, the productivity in the two sectors is comparable. Therefore, rents remain high and share-cropping remains competitive with commercial farming for the capitalist sector. Thus, the land management pattern does not deviate substantially from the case when modernizing technology is not applied at all.

The worker compensation is quite comparable in both cases discussed above, as shown in Figure 12. Evidently, as long as the ownership pattern is not affected, due to strong links between ownership by workers and their wage bargaining position, low worker compensation and concentration of income in the capitalist house-holds will persist.

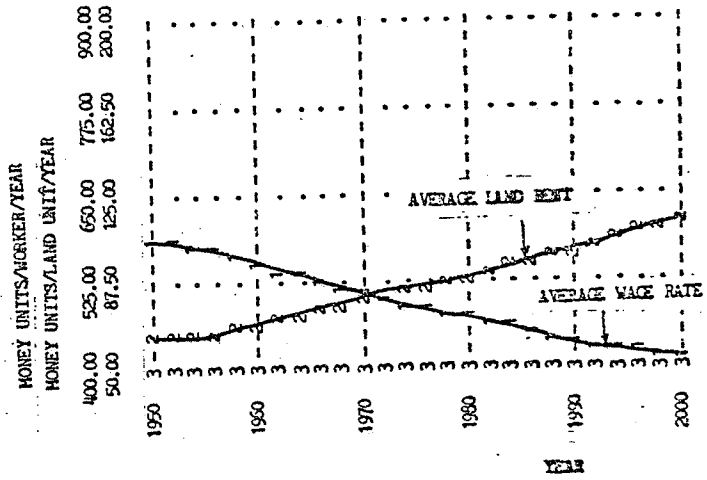


Figure 12(a): Large Scale Technological Inputs Available Only to Capitalist Sector

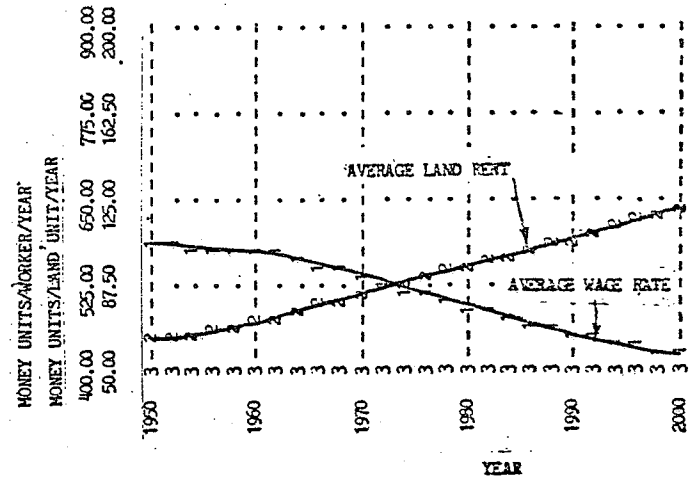


Figure 12(b): Technological Inputs Available to Both Sectors

Figure 12: Modernizing Agriculture: Worker Compensation

6.2 Radical Land Reform

Indeed, land redistribution is recognized as an important income-redistributing factor. However, radical land reform policies incorporating instantaneous transfers of land from the capitalist owners to the self-employed peasants are not only difficult to implement but may also be quite ineffective in the long run.

In Pakistan, two rounds of land reform have been implemented over a period of a little over a decade. Both were on a trivial scale but were concomitant with the the mechanization effort. These reforms reportedly started a chain of private transfers, largely to the family members of the big land-owners. The purpose of these transfers was to make per capita land ownership conform to the official ceilings but to retain its ownership within the family. But land reform did little to change the land distribution pattern. In fact, the small peasant farmers were reported to have lost 7% to 12% of their holdings over the decade following the 1959 land reform. Over the same period, the holdings of the big landlords engaging in commercial farming considerably expanded (Burki: 1976).

Land reform policy is simulated by arbitrarily transferring a million acres of land from the capitalist land-owners to the peasants, while at the same time, modern technology is made available to the capitalist sector as was the case in Pakistan. The land is given free of cost to the peasants, and the capitalists are paid compensation at a rate determined by the going price of land.

Figure 13 shows the changes in distribution of land resulting from the combined effects of mechanization and land reform policies. Although peasant land holdings increase when land reforms are introduced, by the end of the simulation, a large fraction of peasant holdings have been lost to the capitalist owners.

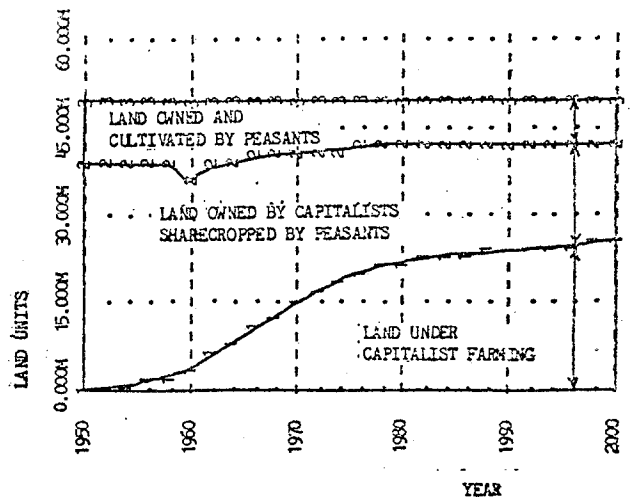


Figure 13: Changes in Land Distribution: Land Reform Introduced With Modernizing Inputs

Transfer of land to the cultivators, at the outset, reduces their rent burden while also raising their claim to income on the basis of ownership. The ensuing increase in the incomes of the self-employed stimulates consumption in the self-employed sector. But increases in self-employed income also bid up wage rates in the capitalist sector. This has two effects: First, the utility of savings for investment in the self-employed sector goes down; second, the number of workers desired to be employed in the capitalist sector decreases. As a result, a large number of workers have to be accommodated in the self-employed sector, which in turn, depresses this sector's consumption as well as savings. Thus, the saving ability of the cultivators and their internal cash balances may not rise with the increase in their land holdings. At the same time, the capitalist share of income is only marginally affected. Capitalists can easily increase the intensity of modern technologies in commercial farming, hire fewer workers and generate enough

savings to bid the self-employed out of their land holdings. As cultivator land holdings decline, income in self-employment decreases, which causes the wage rate to decline rapidly.

Thus, radical land reform may bring only a temporary relief to the cultivators. Such reforms may have to be periodically repeated if their equity objectives are to be realized. Recognizing that land reform is a politically and administratively difficult policy to implement, a continuous program of land redistribution is practically impossible.

6.3 Migration

Migration out of a poor region is often seen by the planners as a way of relieving pressure on the region's overburdened endowments. But migration also decreases the labor resources of the donor region and thus diminishes its production ability (Lipton: 1976). Population redistribution policies, therefore, are a subject of much controversy and debate.

In Pakistan, migration from rural areas followed an ambitious industrial development program implemented in the urban sector during the 1950s and early 1960s. The relative expansion of the urban sector over the past three decades (from 15% to over 30%) indicates that the volume of rural emigration has been quite high. The persistance of rural poverty also shows that the emigration has not helped the rural poor. Lately, however, remittances from the emigrants to the Middle East seem to have increased money incomes of many rural households, but this has also fueled inflation in the absence of corresponding increases in the availability of goods and services.

Migration policy is simulated by activating a rate of rural emigration of people in the model which depends on urban-rural wage differential. The urban wage rate is assumed to be fixed at a level higher than the rural wage rate at the begining of the simulation. The resulting distribution of land is shown in Figure 14.

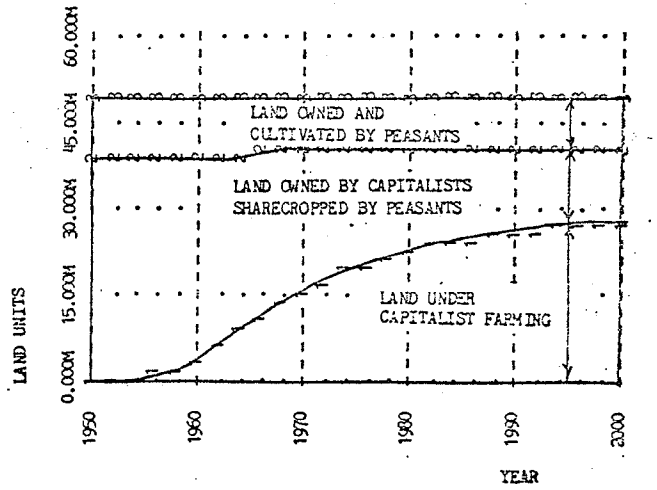
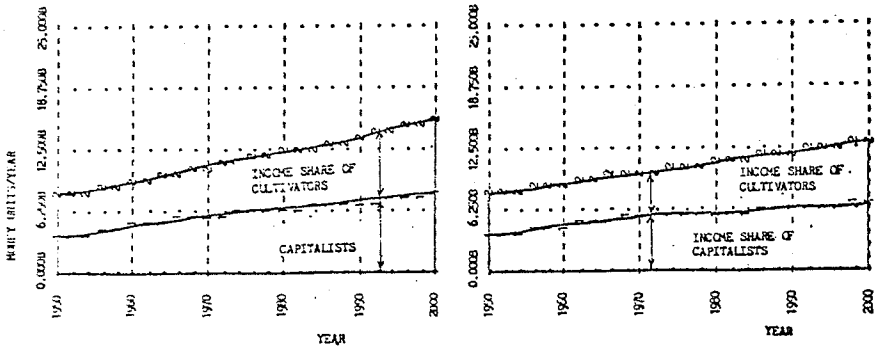


Figure 14: Changes in Land Distribution: Migration Policy

Migration seems to have no effect on the ownership of land, though it causes the land under commercial farming to rise at a faster rate and to a higher level than before in response to the accompanying modernization effort. Figure 15 compares the capitalist and worker shares of income with and without migration. The total income of the agricultural economy grows at a much slower rate with migration than without, due to the continuing attrition of labor resources in the former case, but the share of the capitalists is only slightly decreased. Thus, most of the loss in production is absorbed by the worker's share of income. In the long run, migration will tend to balance the compensation of the rural worker with that of his urban counterpart, but at the cost of a decrease in rural production and without changing the rural land ownership and income distribution pattern. If the wage rate is determined by the economy-wide collective bargaining position of all workers, and the bulk of the workers are from the rural sector, the urban wage rate may not be

expected to be much different from the rural wage rate. In such a case, population growth rates and the rates of relative expansion of the urban and rural economic bases will determine migration. The changes in worker compensation and income distribution in such a system are outside the scope of this analysis.



(a) Without Migration (b) With Migration

Figure 15: Capitalist and Worker Shares of Income with and without Migration

6.4 Fiscal Policies

The key factor responsible for creating a dichotomy between land-owning and land-cultivating classes and the income differentials between them appears to be the absence of a force that should assure ownership of land by its cultivators. Apparently, the ease with which land can be profitably rented out by the owners allows its employment in the sector that efficiently uses it as a production factor. The transfer of ownership, however, is relatively difficult as it involves a concurrent financial transaction. Thus, the ownership of land by a party is not coterminous with the land cultivated

by it. Because ownership is an important basis for claim to income, the cultivators often have to give up a substantial share of their production to the owners.

As the renting practice appears to serve as a means to separate owners from cultivators, renting, in all forms needs to be discouraged. An administrative ban on renting can not only be impossible to implement, but can also be ineffective if imposed in an economic environment where renting is seen as an efficient and convenient practice both by the renters and the rentees. A simple fiscal policy such as taxing rent income is much simpler to implement while also being very effective.

A rent income tax may be quite difficult to collect. Nonetheless, even if the collection of such a tax is inefficient, the presence of the tax should discourage land-renting and share-cropping practices. Thus, the amount of tax needed to be collected may diminish over time and when the practice of renting has ceased, no tax will have to be collected.

It should, however, be recognized that when a fiscal instrument discouraging renting is introduced at the same time as labor-saving technology in an environment where share-cropping dominates, a wave of evictions of the share-croppers from land which is rapidly converted into commercial farms may follow. But these evictions will also increase labor intensity in the peasant farms which absorb the surplus workers. The productivity of peasant farms and their bids for land, therefore, will rise which will also increase the opportunity costs of owning land by the relatively less productive capitalist sector.

The policy of taxing rent income is simulated by subtracting a constant fraction of all rent income from the revenue of the capitalist sector. It is assumed that the rent burden cannot be directly passed on to the rentees as this would limit their demand for renting land. The changes in

the distribution of land caused by the policy are shown in Figure 16. Share-cropped land is either rapidly converted to commercial farms or sold off after the policy is in effect, but holdings of the commercial farmers continue to decline as land prices are pushed up by the intensive peasant cultivation and as the opportunity costs of maintaining investment in commercial farms rise.

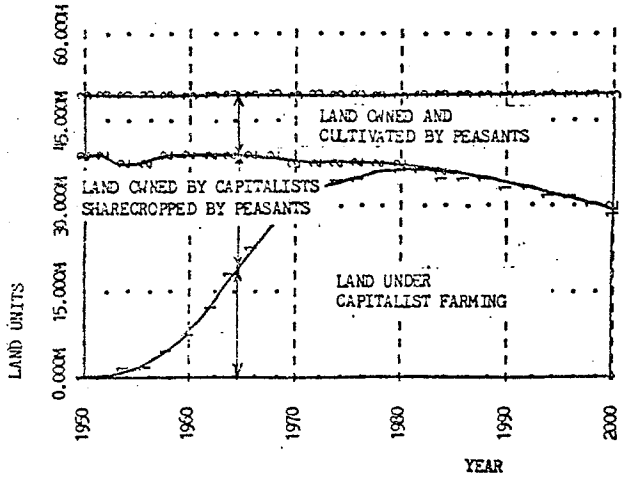


Figure 16: Changes in Land Distribution: Taxation of Rent Income

The final distribution of land between the peasant and commercial sectors will depend on the degree of capital differentiation between the two sectors permitted by the available supply of mechanized implements exclusively available to the commercial farmers. The greater the supply of those implements, the higher the profits in commercial farming, and the greater the area of land under commercial farms. As the use of modern implements can increase productivity by allowing multiple cropping, the limited use of those implements coupled with fiscal policies to discourage renting will limit land

productivity, while making income distribution more equitable. The degree of mechanization, therefore, clearly incorporates a compromize between efficiency and equity. A lower level of mechanized inputs will yield a lower aggregate output with a more equitable distribution of income, while a higher level of mechanized inputs will yield a higher output with less equitable distribution of income, unless ofcourse, mechanized inputs are equally accessible to both sectors and there is no capital differentiation.

7. FRAMEWORK FOR A RURAL REFORM

A rural reform aimed at improving the well being of the people should incorporate objectives of both growth and equity. None of the policies discussed so far appear satisfactory for realizing those objectives when implemented alone. Also, if all policies are introduced together without knowing how they interact with one another, some of them may counteract the others and thus make the outcome of a development program uncertain. Thus, it is important to have knowledge of the individual characteristics of various policies for delineating a set that must underlie a welfare-oriented rural development program.

The first and the foremost requirement of a policy set aimed at alleviating widespread poverty and low worker compensation is that it should encourage ownership of land by its cultivators, so that the cultivators obtain a greater share of the income while also enjoying a better wage bargaining position. Thus, taxation of rent incomes appears to be the most important instrument for a welfare-minded rural reform. Second, for stimulating growth in rural production, it seems necessary to provide modern technological inputs. However, if these technological inputs are available only to the large scale commercial sector, this sector will enjoy an advantage over the small scale self-employed sector, and the degree of land redistribution

achieved will depend on the quantity of modern technological inputs made available. This problem can be overcome by emphasizing the divisibility of modern technology and by encouraging the organization of peasant cooperatives which are able to make use of relatively large scale technologies. Finally, the ability of the self-employed sector to invest in modern technologies may be limited due to the low level of its internal savings. This handicap can be overcome by organizing rural financial markets that should decouple the investment ability of a sector from its saving ability. Policies such as radical land reform appear to be ineffective in the long run, while policies causing emigration from the rural areas can greatly reduce the level of rural production.

Figure 17 shows the changes in the distribution of land ownership when the set of policies delineated above is simulated. Most of the land continues to be farmed by the self-employed sector, but the ownership pattern changes significantly. As share-cropping declines in response to taxation of rent incomes, it is not replaced by commercial farming, but the land taken away from share-cropping is sold out to the peasants and is cultivated by the self-employed workers. Figure 18 shows the the income shares of the capitalists and peasants and wages and rents. The overall income grows significantly due to the application of modern technological inputs, although most of the increases occur in the income share of the cultivators. Land rent rises at a fast rate as productivity of land rises, but as the amount of land under share-cropping diminishes, the rent burden of the cultivators decreases. The rising income of the cultivators allows significant increases in average income per worker even though population is assumed to be growing exponentially.

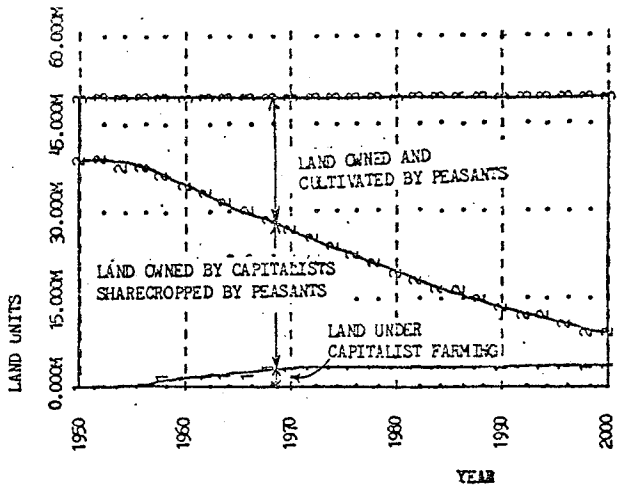


Figure 17: Changes in Land Distribution: Proposed Rural Reform

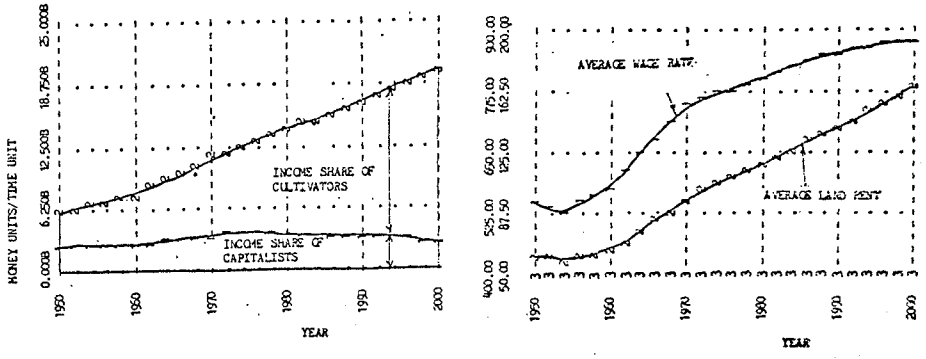


Figure 18: Income Shares, Wages & Rents: Proposed Rural Reform

8. CONCLUSION

The analysis of this paper suggests that the rural poverty problem is strongly linked with the internal tendency of the rural income distribution system to move towards a state of inequality. This tendency arises at the outset because of the determination of the shares of the claimants to income on the basis of their respective bargaining positions which, in turn, depend on ownership of resources by each claimant. The ownership is easily separated from the cultivators in a system where resource ownership must rest with the households having high saving ability while cultivation is carried out by households who are able to employ these resources efficiently. A high degree of dichotomy between land ownership and land cultivation appears as the workers try to maximize consumption while the capitalists maximize profit. Separation of resources from the workers diminishes their claim to income while also undermining their bargaining position and thus is an important cause of their impoverishment. In such an income distribution system, growth-oriented development programs not providing for the redistribution of resource ownership may worsen income distribution and further draw down worker compensation.

Radical land redistribution policies are both difficult to implement and inadequate in their ability to achieve a lasting resource redistribution. On the other hand, fiscal instruments increasing the cost of separation of ownership from the workers appear to be quite promising for bringing about a change in the ownership pattern. Such instruments must form an important part of any rural development program aimed at alleviating poverty.

In general, while the analysis of this paper points towards worker capitalism as a means of improving income distribution, a rather slow and painstaking process for promoting worker capitalism is suggested. Thus, the proposed policy framework requires a long term commitment on the part of the

polity and the administration to the cause of the rural poor. However, the governments of most developing countries appear to be preoccupied with the problems of maintaining political power and can rarely give long term support to such a public issue, especially, if the public plays a trivial role in the political processes. These governments have traditionally sought rapid growth with little concern for income distribution. And the administrative institutions in the developing countries continue to operate on a colonial pattern that is characterized by an orientation of the bureaucracy towards self-aggrandizement and service towards the policy and the rule (Onwuchekwa: 1973).

Furthermore, traditional planning theory has long advocated a growth-before-equity attitude even though it has often recognized a trade-off between growth and equity (Alonso: 1975). Needless to add that most planning institutions depend for their livelihood on the polity and have little choice but to endorse the self-aggrandizing attitudes of the political and administrative institutions. As a result, a rural reform on the suggested lines may be very difficult to conceive and implement in most developing countries. The analysis, therefore, points towards the political, administrative, and intellectual obstacles in implementing effective anti-poverty programs rather than finding poverty an unsolvable problem. A lot more work is needed on those aspects.

There are also several simplifying assumptions that limit the scope of this study. The model does not incorporate mechanisms for endogenously determining the rate of population growth, which in the real world is postulated to depend on several factors. Also, the role of the urban economy is not endogenized in the model, while strong links exist between urban and rural sectors that govern their relative growth rates and income transfers between them. The demand of agricultural products is also not adequately

related to the incomes and to the manufacturing base. Additional work is needed for relaxing those simplifying assumptions and expanding the scope of the study to both urban and rural sectors of the income distribution system.

REFERENCES

ALAVI, Hamza, "The Rural Elite and Agricultural Development", in STEVENS et.al. (eds.) Rural Development in Bangladesh and Pakistan, Hawaii Univ. Press, 1976.

ALONSO, William, "Urban and Regional Imbalances in Economic Development", in Friedman and Alonso (eds.) Regional Policy: Readings in Theory and Applications, MIT Press, 1975.

ANDERSON, K.P., Peasant and Capitalist Agriculture in the Developing Country, Ph.D. Thesis, MIT, 1968.

BARDHAN, P.K., "A Model of Growth of Capitalism in a Rural Agrarian Economy" in Bhagwati and Eckus (eds.), Development and Planning, MIT Press, 1973.

BURKI, S.J., "The Development of Pakistan's Agriculture: A Multidisciplinary Approach", in Stevens et.al. (eds.) op. cit.

FALCON, W.P., & STERN, J., Growth and Development in Pakistan, Center for International Affairs, Harvard Univ. Press, 1970.

GALBRAITH, John Kenneth, The Nature of Mass Poverty, Harvard Univ. Press, 1979.

Govt. of Pakistan, Pakistan: Basic Facts: 1977-78, 16th edition, Finance Div., Economic Advisor's Wing, Pakistan.

GRIFFIN, Keith, "Increasing Poverty and Changing Ideas about Development Strategies", Development and Change, No. 8; 1978.

GRIFFIN, Keith, "Growth and Impoverishment in Rural Areas of Asia", World Development, Vol. 7, No. 4/5, April - May, 1979.

HAIDER, Azimushan, Economic History of the Region Constituting Pakistan 1825-1974, Karachi, 1975.

HAQ, Mahboobul, The Poverty Certain: Choices for the Third World, Columbia University Press, NY, 1976.

LIPTON, Michael M., Why Poor People Stay Poor, Harvard Univ. Press, 1976.

MCKINNON, Ronald I., Money and Capital in Economic Development, The Brooking Institution, Washington D.C., 1973.

MELLOR, John W., "The Subsistance Farmer in Traditional Economics", in Wharton Jr., C.R., Subsistance Agriculture and Economic Development, Aldine Publishing Co., Chicago, 1969.

Mizrow, John D., Dynamics of Community Development, Scesecraw Press, 1963.

NUTLEY, Lesley, The Green Revolution in Pakistan: Implications of Technological Change, Praeger, NY, 1982.

ONWUCHEKWA, K. Okijwe, Burcancracy and Nation Building: Facts and Problems of Rationalization, Ph.D. Thesis, MIT, 1973.

Pakistan Economic Survey, 1977-78, pp. 8 - 13.

PAPENAK, Gustav F., "Economic Development Theory, The Ernest Search for a Mirage", in Nash M. (ed.), Essays in Economic Development and Cultural Change in Honor of Bert F. Hostlitz, Univ. of Chicago Press, 1977.

ROULET, Harry M., "The Historical Context of Pakistan's Rural Agriculture", in Stevens et.al., op. cit.

SAEED, K., Worker Compensation and Income Distribution in a Dual Agrarian Economy, No. M101, Division of Industrial Engineering and Management, AIT, 1981.

SAEED, K., Rural Development and Income Distribution: The Case of Pakistan, Ph.D. Thesis, MIT, 1980.

Appendix A

Information about the Modelling Effort:

1. Source of the Idea:

Frustration with rhetorical views on poverty and naive models forming bases of most economic development programs in the developing countries.

2. Objectives of the Effort:

To explain poverty as an income distribution problem, to find out why economic development effort has not alleviated poverty, and to attempt design of programs to overcome poverty.

3. Possible Clients:

National planning organizations, Agencies giving economic aid.

4. Baises of the Modelling Process:

Part of the supervision for this work came from conventional planners. Thus, a large part of the effort was directed to comparing and reconciling the model structure with the economic development literature. The use of a case study provided empirical validity to the analysis and apparantly enhanced its expository value.

5. Reflection of the Interests of the Public Sector Decision Makers:

The model incorporates in its boundary mechanisms governing behavior of the private sector only. Public sector decisions related to development policies are treated exogeneously. This implies that the public sector decisions are independent of the pressures from within the private sector, and that the policy decisions can be implemented without being modified over the course of implementation. Additionally, the model structure incorporates mechanisms that can be coupled with ease with most conceivable public policies. Such a model structure was developed keeping in view the policies the model might be used to test.

Appendix B
CLASS II DOCUMENTATION STANDARDS
FOR SIMULATION MODELS

. ACCESS TO MODEL:

Name of Model: RINCOM

Name and current address of the senior technical person responsible for the model's construction: K. Saeed, Assistant Professor AIT, P.O. Box 2754, Bangkok, THAILAND

Who funded the model development? unsponsored

In what language is the program written? DYNAMO II

On what computer system is the model currently implemented? last implemented on PRIME 400. Further work planned on IBM 3031

What is the maximum memory required to store and execute the program? N.A.

What is the length of time required for one typical run of the model? N.A.

Is there a detailed user's manual for the model? No, but complete documentation of the model is available.

. PURPOSE OF THE MODEL:

For what individual or institution was the model designed? model developed as part of Ph.D. work at MIT

What were the basic variables included in the model?

Land, capital, self-employed workers, wage workers, production, income shares, wage rate, savings..

Over what time period is the model supposed to provide useful information on real world behavior?

20 - 30 years

Was the model intended to serve as the basis of:

an academic exercise designed to test the implications of a set of assumptions or to see if a specific theory would explain historical behavior	yes
communication with others about the nature and implications of an important set of interactions	yes
projecting the general behavioral tendencies of the real system	yes
predicting the value of some system element(s) at some future point in time	no

. MODEL SPECIFICATION AND THEORETICAL JUSTIFICATION:

Provide two diagrams illustrating the extreme behavior modes exhibited by the major model elements:

If they are not included in the body of the paper indicate where the reader may find:

a model boundary diagram that indicates the important endogenous, exogenous and excluded variables

a causal influence diagram, a flow diagram, the computer program and definitions of the program elements

} Saeed, K., Rural Development and Income Distribution: The Case of Pakistan, Ph.D. Thesis, MIT, 1980.

Is the model composed of:

simultaneous equations			
difference or differential equations	X		
procedural instructions			
Is the model deterministic	X	or stochastic	
continuous	X	or discrete	

4. DATA ACQUISITION

What were the primary sources for the data and theories incorporated in the model?

Data Economic Survey of Pakistan

Theory Economic Development Literature

What percent of the coefficients of the model were obtained from:

measurements of physical systems	0%
inference from social survey data	50%
econometric analyses	
expert judgment	
the analyst's intuition	50%

What was the general quality of the data? mixed, though having good qualitative content.

5. PARAMETER ESTIMATION

If they are not given in the publication, where may the reader obtain detailed information on the data transformations, statistical techniques, data acquisition procedures, and results of the tests of fit and significance used in building and analyzing the model? Saeed, K., Rural Development and Income Distribution: The Case of Pakistan, Ph.D. Thesis, MIT, 1980, Appendix B.

6. MODEL PERFORMANCE AND TESTING

Over what period was the model's behavior compared with historical data?

"Historical tendency" over about 100 years compared

What other tests were employed to gauge the confidence deserved by the model?

Reconciliation of the structure and the behavior with the theoretical and empirical evidence, sensitivity to variation in assumptions, sensitivity to changes in parameters, testing policies with known performance.

Where may the reader obtain a detailed discussion of the prediction errors and the dynamic properties of the model? Limitations and dynamic properties discussed in Saeed, K., Rural Development and Income Distribution: The Case of Pakistan, Ph.D. Thesis, MIT, 1980.

7. APPLICATIONS

What other reports are based upon the model? Saeed, K., Worker Compensation and Income Distribution in a Dual Agrarian Economy, IE & M Div. #M101, AIT, 1981

Name any analysts outside the parent group that have implemented the model on another computer system. -

List any reports or publications that may have resulted from an evaluation of the model by an outside source. -

Has any decision maker responded to the recommendations derived from the model? No

Will there be any further modifications or documentation of the model? yes

Where may information on these be obtained? K. Saeed, IE & M Div., Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand