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9. ABSTRACT

In this paper we first consider, in section II, some simple theoretical models of income distribution and growth in less developed countries with emphasis on the distinction between the traditional (or informal) sector and the modern sector. In section III, we discuss the case of extreme dualism in which incomes in the modern and traditional sectors diverge very significantly and the divergence seems to grow.

In sections IV and V, respectively, we analyze the income distribution implications of the distribution of human capital assets and of private physical assets among the population. In section VI, we discuss how government expenditure and taxation policies can modify the distribution of income.

In section VIII, we consider the various policy options available which might alter the distribution of income and the theoretical constructs useful in the analysis of these policies. We identify four distinct sets of policies: 1) market interventions, 2) confiscatory policies, 3) redirection of public services, and 4) government expenditure-oriented policies. Each of these policy sets is analyzed in a different manner.

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INCOME DISTRIBUTION AND GROWTH IN LESS DEVELOPED COUNTRIES: SOME REFLECTIONS ON THEORY AND POLICY

by Charles R. Frank, Jr. and Richard Webb

Prepared for the Princeton/Brookings Income Distribution Project

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INCOME DISTRIBUTION AND GROWTH IN LESS DEVELOPED COUNTRIES: SOME REFLECTIONS ON THEORY AND POLICY

by Charles R. Frank, Jr. and Richard Webb 1/

The main focus of this volume is on policies which affect income distribution. There are two prior questions, however, which ought to receive attention before launching into a discussion of policy. The first is a positive question; the second a normative one. First, what is the nature of the economic mechanism which generates a distribution of income? The nature of this mechanism affects very much how various policies might work and, most importantly, what might be the secondary, or unintended, effects of a particular policy action. If market imperfections are a main source of variations in income and wealth among individuals, then policies designed to break those imperfections may be the most efficacious.

The normative question which must be asked is: what are the goals of policy? Should policy be designed to alleviate the grinding poverty of the very poorest segments of the population? Should it attack the incomes of the very richest? Or should the focus be not on income distribution per se but on increasing the mobility of individuals within a particular distribution of income? This second or normative question

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1/ The authors wish to thank Gerald Epstein who served not only as a research assistant but also as a very perceptive critic.

is the subject of a paper by Richard Szal and Sherman Robinson in this volume. The first question as to the mechanism which generates the distribution of income and changes in that distribution as development takes place is the subject of this paper.

I. Introduction

The standard approach in the literature on the economics of income distribution is to analyze the receipt of income in terms of returns to the factors of production, land, labor and capital. The starting point is usually marginal productivity theory. [1/] Modifications are often made to the theory to take into account market imperfections. The theory of income distribution is not well developed, however, for analysis of policies for altering income distribution.

It is not surprising that there is no well-unified theory of income distribution. There are many factors which affect the distribution of income and many conceivable policies which could alter income distribution. It is foolish to think that any one theory can provide a model for analyzing all these factors and policies. Theoretical models must be designed with a specific and limited purpose in mind. Otherwise, the number of variables and the inter-relationships among them become so complicated that analysis is impossible.

1/ For a comprehensive discussion of marginal productivity theory as it relates to income distribution, see Martin Brofenbrenner [1971].

In this paper we first consider, in section II, some simple theoretical models of income distribution and growth in less developed countries with emphasis on the distinction between the traditional (or informal) sector and the modern sector. In section III, we discuss the case of extreme dualism in which incomes in the modern and traditional sectors diverge very significantly and the divergence seems to grow.

In sections IV and V, respectively, we analyse the income distribution implications of the distribution of human capital assets and of private physical assets among the population. In section VI, we discuss how government expenditure and taxation policies can modify the distribution of income.

In section VII, we consider the various policy options available which might alter the distribution of income and the theoretical constructs useful in the analysis of these policies. We identify four distinct sets of policies: 1) market interventions, 2) confiscatory policies, 3) redirection of public services, and 4) government expenditure-oriented policies. Each of these policy sets is analyzed in a different manner.

II. Simple Models of the Relationship between Income Distribution and Growth

The basic model which we prefer to use in analyzing the relationship between income and growth is the dualistic model in which there are two main sectors, modern and traditional, or more appropriately, modern and informal. At times, we may also want to distinguish between urban and rural subsectors of the informal and modern sectors.

Workers in the traditional sector have much lower average levels of productivity and also lower wages than those in the modern sector. Capital accumulation in the modern sector is more rapid than that in the traditional sector and workers are transferred from the traditional sector into the modern sector as development proceeds. As in the usual labor surplus model of growth, the supply of labor from the traditional sector to the modern sector is infinitely elastic. 1/

Growth in the dualistic context is in part a consequence of being a late-comer: resources are suddenly switched from very traditional technologies to the best-method techniques of today. In these labor surplus models, growth takes place more by the large, discrete jump in the productivity of factors reallocated from informal to modern activities, than by a widespread and gradual increase in the productivity of all factors.

In the initial stages of dualistic development the distribution of income worsens, first because the growth in total income makes greater inequality possible (inequality cannot be great in a largely subsistence economy, see Reder [1969]) and second, because dualistic growth in a labor surplus context implies that most of the growth in output and incomes will accrue to owners of capital and to the minority of workers who make the transition from the informal to the modern sector. This model also implies that the trend towards increasing inequality will slow down, and that it may reverse. Once a majority of labor is incorporated into the high

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1/ See W. Arthur Lewis [1954] and John C. Fei and Gustav Ranis [1964].

productivity, high-wage sector, further transfers of workers actually improve the distribution of labor income. Also, eventually labor in the informal sector is no longer in excess supply, so further modern sector absorption of labor will tend to raise traditional sector incomes. Whether the overall distribution of income actually begins to improve, however, will depend on changes in the share and degree of concentration of property income and these changes cannot be predicted from this model. 1/

Several statistical studies tend to corroborate the predicted relationship between growth and inequality. The best known is Kuznets' [1955] observed association between inequality and the level of development. The trend shown by the measures compiled by Kuznets, of GNP per capita and inequality, fall into a pattern that is now commonly referred to as the Kuznets, or U-shaped hypothesis: inequality first rises and later falls as an economy progresses from very low to high levels of development. This pattern was borne out by both the cross-section and the time-series data examined by Kuznets. Kuznets outlines various mechanisms to explain this pattern, particularly the earlier trend of increasing inequality. His explanations are plausible but to the extent that they go beyond the mechanics of the labor surplus model, they are more suggestive than rigorous. Other studies which support the U-shape hypothesis include those of Adelman and Morris [1973], Weiskoff [1970],

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1/ For a good discussion of these relationships, see R. Albert Berry [1970].

en: Paukert [1973].

The dualistic model of development implies a somewhat fatalistic approach to income distribution in developing countries. In the initial stages of development, the distribution of income is certain to become worse. The modern sector is dynamic and the source of profits and savings from profits. What little surplus emerges in the traditional sector often accrues to a rentier class who, in the best of circumstances, transfer the surplus into modern sector investments or, at worst, dissipate the surplus in high-living. In the long-run, however, the degree of inequality is certain to diminish--but the distribution of income must first get worse before it gets better.

This basically pessimistic conclusion is reinforced by the usual presumption that it is the rich households that save and the poor households that consume. It is often argued that any attempt to redistribute income from the rich to the poor will reduce total savings and investment and thus reduce the rate of growth. The validity of these arguments, however, depends on fairly large differences in marginal (rather than average) savings rates between the rich and the poor. Recent empirical work (see, for example, Cline [1972] and Reynolds [1974]) indicates that such large differences do not seem to exist and that the trade-off between more equal income distribution and savings rates is very small, if it exists at all.[1/]

1/ In this context should be mentioned efforts by James Land and Donald Soligo [1971] and [1972] to analyze the relationship between income distribution and growth. Their basic hypothesis is that income redistribution results in more demand for labor intensive commodities and less demand for import-intensive commodities because of differing expenditure patterns among the rich and the poor. Thus, income redistribution might result in more efficient production and stimulate rather than retard growth. Empirical tests of these hypotheses, however, have been inconclusive. See Land and Soligo [1974], Ballentine and Soligo [1974], Huddle [1974], Soligo [1973] and Summan [1973].

Furthermore, there is little in the way of recent historical experience of developing countries to indicate that the relationship between growth and the distribution of income is a very simple one. A study by Ahluwalia [1974] suggests that the fastest growing less developed countries have less rather than more inequality. In some rapidly developing countries, inequality has been decreasing (e.g. Taiwan), in others, it has neither increased nor decreased (e.g. Korea), while in still others, the distribution of income is becoming rapidly more unequal (e.g. Mexico and Brazil). Although the Ahluwalia study lends some credence to the Kuznets, U-shape hypothesis, the relationship is weak and there are many countries which deviate substantially from the Kuznets norm. The levels of unequality vary substantially among poor countries and among rich countries. There is considerable overlap in the degree of inequality among countries at all levels of development.

The empirical evidence suggests that there are many factors which operate on the distribution of income and that these factors may change over time within any one country. It also suggests that there is considerable scope for policies to alter the distribution of income.

A more complicated theory of growth and distribution is required to explain the empirical findings. One way to approach such a theory is by assuming that the overall distribution of income can be decomposed into two parts: 1) that due to variations of income within the modern and traditional sectors (or within the urban and rural subsectors), and 2) that due to variations in income between sectors. The overall level of inequality is a function, then, of the two sources of variation,

that within and that between sectors, and also the relative size of the various sectors.

III. Isolation of the Modern Sector: Dualism Run Rampant

In order to analyze further the relationship between distribution and growth, let us contrast two extremes in terms of initial conditions. At one extreme, the modern and informal sectors are highly differentiated, with large differences in productivity and wage structure between the sectors. The modern sector, with its relatively high wage rates is highly capital intensive, enjoys high levels of import protection and uses relatively sophisticated technology. At the other extreme, the differences between the sectors are minimal. Wage rates are similar for similar jobs and the markets for labor and capital are highly competitive with relatively few imperfections.

In an economy with highly differentiated sectors, high profits are maintained by protection from imports, subsidized interest rates, modest taxes on corporations and an overvalued domestic currency, combined with an exchange control system which encourages imports of low-cost capital goods. 1/ In an economy which is not highly dualistic, high profits arise because of modest real wages in the modern sector, rather than because of capital subsidies. If profits in both types of economy are relatively the same, the overall distribution of income in the highly dualistic economy will be much worse than in the relatively homogeneous

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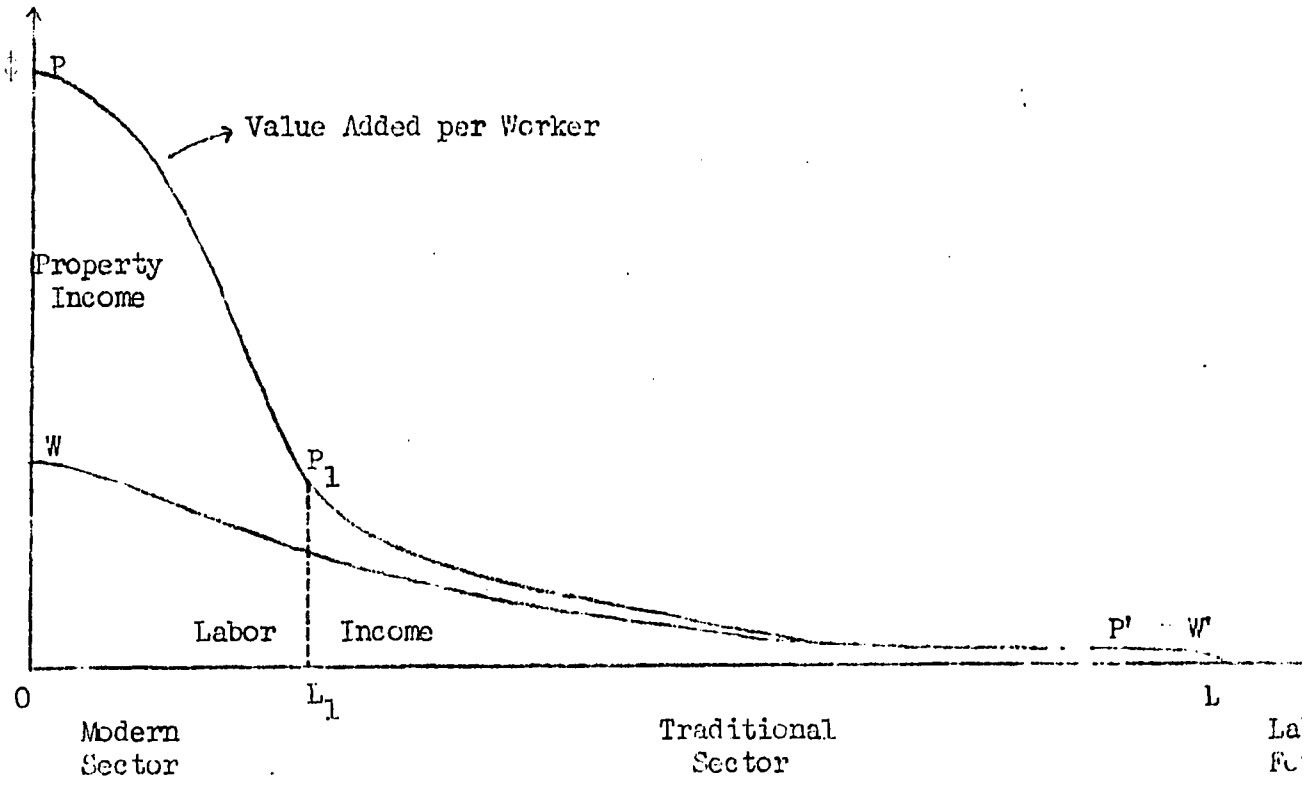
1/ See Little, Scitovsky and Scott [1970] for a good theoretical and empirical survey of these issues.

economy. 1/ The reason, of course, is the difference in income between modern sector workers and workers in the informal sector.

A simple way to represent the link between dualism and income distribution is shown in Figure 1. 2/ The curve PP' describes the

Figure 1.



1/ Adelman and Morris [1973] found that income inequality was highly associated with dualism in their 44 country sample.

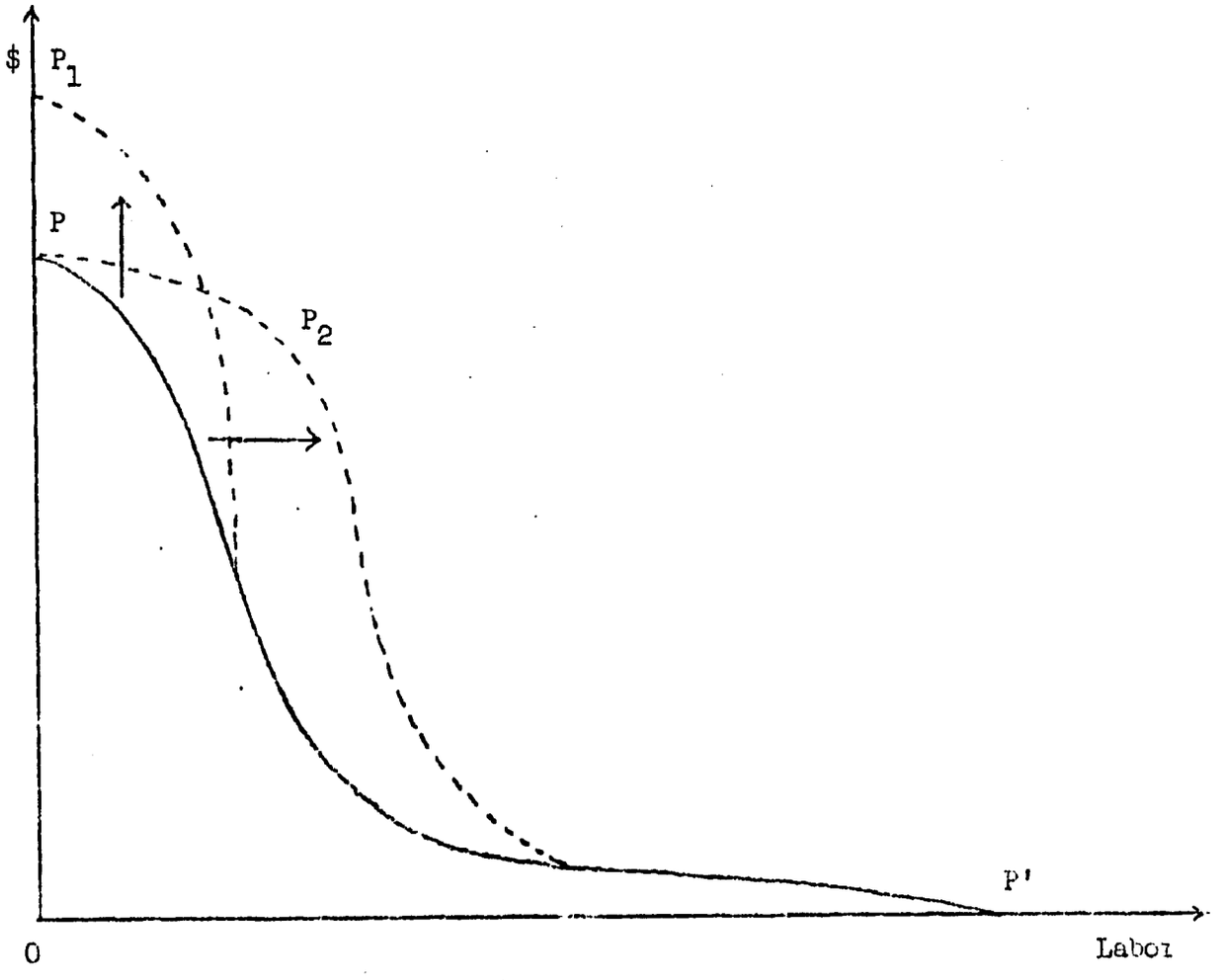
2/ For a more detailed exposition of this model, see R. Webb, [Forthcoming], Chapter 5.

distribution of labor productivity in a dualistic economy: a small number of workers (OL_1) working with large amounts of machinery, equipment and natural resources, and using modern technology, have high levels of productivity (value added per worker); scarce resources and traditional technologies generate much lower levels of productivity for the labor force in the "traditional sector" (L_1L). The latter sector generally has both urban and rural components, while the modern sector is largely urban in most countries, but can have a large modern farming or plantation component in some countries.

The income distribution is described in Figure 1, first, by the shape of WW', which represents the income received by each worker, be it a wage, or a mixed entrepreneurial and labor income, if he is a self-employed. The area under WW' is the share of labor in national income; the area above is the share of property income now accruing to self-employed persons i.e., it is the share accruing to "capitalists."

A pattern of growth now common to many developing countries involves increasing dualism: output per worker grows faster in the modern than in the traditional sector, and at the same time, the modern sector does not grow significantly as a proportion of the labor force. This growth pattern, described by P_1P' in Figure 2 is contrary to the horizontal, labor-absorbing growth path predicted by the labor surplus model (PP_2P').

Figure 2.



Increasing dualism in the structure of production is accompanied by increasing income disparities between sectors. Differences in income between modern and traditional sectors become far more important in explaining income inequality than variations of income within sectors.

The key mechanism in this growing concentration of income is the growth of wages in the modern sector. 1/ Wage increases in this sector

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1/ For a detailed theoretical and empirical survey of these issues, see Little, Scitovsky and Scott [1970], and Turnham and Jaeger [1971].

can come about because of increased unionization and the political strength of labor groups. Another reason why wages in the modern sector might be pushed up and relatively few workers employed in the modern sector is the result of an increase in the supply of skilled and educated labor. This results in employment of more high-level manpower and possibly considerable substitution of high-level manpower for unskilled workers, especially if the elasticity of substitution between skilled and unskilled workers is high.

High wages and low levels of employment in the modern sector may also be a function of imported technology, particularly that embodied in imported capital equipment. If imported equipment is skilled-labor using and unskilled-labor saving, the demand for skilled workers will increase relative to the demand for unskilled workers. The wages and employment of skilled workers relative to unskilled workers will increase, driving up average wages in the modern sector. Alternatively, the capital equipment used in the modern sector may require workers to be trained on the job to very high levels of skill and productivity. If these skills are transferable from one firm or factory to another, at least part of the increased productivity due to on-the-job training will accrue to the individual worker in the form of higher wages.

A final type of mechanism involves government policies, such as subsidized credit and an overvalued currency, which encourage capital-intensive modes of production in the modern sector. Entrepreneurs, basing their investment decisions on current wage rates and subsidized capital, may install plant and equipment which locks them into a high capital-labor

ratio. Under these circumstances, the level of profits per worker may be quite high. Ex-post, organized labor groups within a highly-capitalized firm may see the opportunity to increase their share of the profits by pressing for higher wages.

With these kinds of factors operating, there is a tendency for high wages and capital intensity to interact. High wages relative to the cost of capital induce entrepreneurs to invest in a capital-intensive fashion. Conversely, highly capital-intensive firms provide opportunities for: a) on-the-job training which increases productivity and b) high levels of profit per worker, both of which lead to higher wages. These interacting tendencies make the modern sector more and more distinct from the traditional sector and increase income disparities between the two sectors through time.

The above view exaggerates the degree of "bottling-up" of productivity and income within the modern sector. It neglects the offsetting influence of smaller-scale technological changes within the informal sector (e.g., new seeds, bicycles, power tools and sewing machines), and of demand spillovers for both urban traditional products and services and for farm goods. The first is a relatively autonomous trend, not necessarily related to developments in the modern sector. The second, however, is a direct function of the growth of modern sector income, especially in the case of the urban traditional sector where total income and employment depend largely on total income in the modern sector. The rapid growth of the urban traditional sector is a major form of income "spillover" and thus, a major qualification to the simple dualistic

growth model described above.

The existence of these various offsetting influences to increasing dualism is evident in the income growth experience of broad groups of informal sector workers in countries such as Colombia (Berry and Urrutia [forthcoming]), Mexico (Navarrette [1970]), and Peru (Webb [forthcoming]). At the same time, the existence of some trickle-down amounts to a qualification, but not a substantial modification of the picture of growing dualism and inequality described in Figure 2.

By way of contrast, in the homogeneous economy, since there is no factor price distinction between modern and informal sectors, as development proceeds, the increased demand for labor tends to raise real wage rates uniformly throughout the economy. Whether income inequality increases or decreases depends, in part at least, on the elasticity of substitution between labor and capital.

IV. Returns to Human Capital Assets

In the previous section, we emphasized the role of wage rates in influencing the distribution of income. In this and the next section, we emphasize rates of return to privately-owned assets, both human capital assets and physical assets, and the distribution of those assets among the population. An unequal distribution of wealth in the form of physical or human capital assets can make the distribution of income very considerably both within sectors and between sectors.

The returns to human capital assets in the form of wage and salary payments differ considerably from individual to individual and from country to country. Generally, in less developed countries disparities

in wages among different skill levels tend to be very great. For example, in a less developed country a common laborer might make $1.00 per day, a skilled craftsman $7.00 per day, and an office manager $25.00 per day. In a developed country, however, the ratio instead of being 1 to 7 to 25 might be 1 to 2 to 2.5 for the three different classes of workers.

One explanation for wage and salary differentials is marginal productivity theory. [1/] According to the theory, each individual is paid his marginal product. Marginal products differ because of differences in both acquired and innate skills. The differences are particularly acute at low levels of development since persons with a high level of acquired skills are in short supply relative to the supply of unskilled labor. Those individuals in possession of scarce skills receive quasi-rents. As skills are acquired through education and training, wage and salary differentials should narrow and the quasi-rents accruing to individuals with scarce skills will disappear. Differences in wages and salaries remain because of differences in innate abilities and differences in motivation and attitudes which lead to productive efficiency.

One of the corollaries of the marginal productivity theory is that it would be inefficient to attempt to equalize wages and salaries. Without these differences there would be no incentive to improve skills through education and training, no reward for motivation, and effort, no premium for the use of imagination and innovational abilities. Even

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1/ As supplements to the comprehensive review of marginal productivity theory in Bronfenbrenner [1971], see Reder [1969] and J. Mincer [1970].

innate skills would not be used unless some differential were paid to elicit their use. Wage and salary equality can be bought only at the expense of inefficiency and stagnation. This is particularly true in less developed countries where equalization of wages and salaries would induce skilled individuals to emigrate to other countries where their skills are rewarded differentially.

This corollary, however, carries little force if there are significant market imperfections or skills are acquired on the job rather than through education or prior training. For example, the trade-off between equality and efficiency might not be as great as the marginal productivity theory suggests if access to education and training for the acquisition of skills is not equal. Only children of rich families can afford to forego income during the period of education and training. In theory, a poor family could borrow to educate their children and the return in the future would more than enable the loan to be repaid. Capital markets, however, are imperfect so that borrowing for such a long term and uncertain return is not usually feasible for the poor family. The answer by the marginal productivity theorist to this criticism is usually that the solution lies not in attempts to equalize wages and salaries but to improve the functioning of capital markets by some form of government intervention.

Another type of market imperfection occurs when monopoly power is exercised by various segments of the work force. The basic techniques used are the restriction of entry into specific jobs or professions which forces up the market price of the workers or professional services among

the members of a trade, profession, or industrial union. Sometimes entry into a trade or profession is restricted by numerical quotas, as is done by more skilled trade unions. Other times entry may be restricted by professional opposition to an expansion in training facilities as the medical profession in the United States has been accused of doing. Some professional groups such as certified public accountants and insurance actuaries, have a very stiff series of examinations which must be taken over an extended period of time and which serve effectively as a barrier to entry for many people aspiring to these professions. Entry into professions is often restricted by customs which discriminate against minority groups, blacks, ethnic groups, or foreigners, or discriminate on the basis of class or caste, political affiliation, sex, etc.

Examples of the use of bargaining or political power to set fees or prices for services also abound. Real estate and stock brokers operate on the basis of fixed commission schedules. Labor unions bargain for higher wages. The more powerful unions or those led by more skillful bargainers reap the largest gains in wages and fringe benefits. Those not represented by powerful unions suffer relatively. This is particularly a problem in less developed countries in which the modern urban sector is relatively small. Workers in that sector are often the only ones represented by strong unions or they are able to exercise political power directly through demonstrations and general strikes. The great mass of workers operating in the traditional sectors do not have such power.

A variant of this theory is that education imparts no skills at all, but merely provides a series of barriers at each level of education over which only the more able and industrious are able to hurdle. Real skills are acquired on the job, but educational attainment is related to the ability to absorb training and acquire skills rapidly since education is an indicator of intelligence and diligence. 1/

The theory that skills and earning capacity are acquired on the job and are very job specific leads to different conclusions with regard to the effects of artificially imposed wage equality. Under this theory, wage and salary differentials arise because skills are embodied in workers through the process of on-the-job training. If wages were made more equal, employers would still have incentive to train their workers and increase productivity. Wage and salary differentials are not needed to give incentive to workers to increase their education and training prior to their entry into the job market.

V. Factors Affecting the Distribution of Income from Private Assets

Although there may be a host of factors operating to determine income from wages and salaries, the main difference between the very rich and the poor is not wages and salaries but income accruing from privately held assets. In many less developed countries, particularly in Latin America, large fortunes are made from holdings of large tracts of land. As industrialization takes hold, some people become very rich through the accumulation of industrial assets.

1/ A similar model in which skills are imparted on the job, not in school, is the "job competition" model of Thurow and Lucas [1972].

Like in the case of returns to labor, the most well-developed economic theory of the distribution of income from assets is the marginal productivity theory. The return from the use of a physical asset is its marginal productivity.

According to the marginal productivity theory, assets are accumulated through time by individuals with a low rate of time discount 1/ People with a low rate of time discount save and invest and in this manner accumulate assets. Differences that arise in the rate of accumulation of assets also arise because of differences in risk aversion. Since some investments are risky while others are not, and some investors have an aversion to risk, the investor who is willing to take extra risks can expect a higher average return on his assets, and thus on the average, investors who are willing to accept risks will accumulate assets more rapidly.

If the rate of return on assets were eliminated or forced to a low level, there would be no incentives to accumulate assets, either by improving land or investing in buildings, equipment or machinery and no incentive to take risks. Some returns, which are in the form of pure rents, accruing to ownership of land and natural resources, could be confiscated without any adverse affect on incentives and efficiency. It might be difficult, however, to determine the pure rental element of an asset's value, and any attempt to confiscate the pure rental element may in fact also reduce the incentive aspect.

1/ The most thorough discussion of determinants of the distribution of private wealth is in Meade [1965].

The marginal productivity theory is criticized by those who see little justification for interest income. A problem arises in trying to explain the rate of interest; marginal productivity theorists would say that the rate of interest is the marginal productivity of capital (or capital goods in general). Critics of the marginal productivity theory, however, have shown that this assertion is inconsistent with the notion of a declining marginal productivity of capital (i.e. there can be re-switching between capital and labor intensive techniques), a key assumption of the marginal productivity theory. 1/

The difficulty with the marginal productivity theory is not the conceptual problems involved, but the fact that it is an equilibrium theory in which returns to assets should be equalized from industry to industry and owner to owner. In fact, returns vary significantly among different industries and owners of assets and exogenous shocks constantly give rise to disequilibrium situations and substantial windfall gains. In this kind of economy, fortunes, large and small, are often made in a very short period of time, much less than a generation, through a combination of luck, skill and imagination starting with only a small amount of capital in the beginning. Very often luck is the only factor involved. The owner of a piece of land on which someone else discovers oil, the commodity trader or stock broker who buys on margin or sells

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1/ See Joan Robinson [1953-54] which initiated a long series of attacks on the marginal productivity theory of distribution. See also Kaldor [1955-56] and Sraffa [1960] for a few of the more important critiques. For a good general survey of the recent controversy on marginal productivity theories of distribution and other related issues, see Harcourt [1972]

short and catches a few price swings going in the right direction, or the owner of a shop on a country road which is converted into a major highway may be nothing more than lucky, totally lacking in skill, imagination, or willingness to take large risks. Windfall gains of this sort occur frequently; sometimes they are taken in the form of capital gains, sometimes in the form of increasing earnings over the lifetime of an asset.

Luck is one factor involved in the returns from physical assets. Another factor is pure rent obtained from assets which are in fixed supply. Ownership of land and other natural resources in fixed supply confers a rental value. Natural rents are unearned in the sense that they represent a surplus over marginal productivity. In theory, if they are taxed or confiscated, there will be no adverse effects on efficiency. In fact, few natural resources are in truly fixed supply (land can be reclaimed from the forest, the desert, or even the sea, and mineral resources continue to be discovered) so that it is not easy to determine what part of a payment for an asset represents pure rent.

Another factor is monopoly rents. The return to assets is a function of market power and the way in which market power is used to increase the return.

Enterpreneurial and management skills are another factor. Although the extra return to assets obtained by skillful management might be thought of as a return to human assets, in fact these skills often cannot be exercised or developed unless one is an owner of substantial assets.

Market imperfections caused by restrictive government policies can also substantially alter the return to assets. By placing import restrictions on certain items, the owners of import licenses and domestic producers of restricted items may receive a much better return on their assets. A rental value is created for their assets by a government-imposed scarcity. Investment controls, price controls, and foreign exchange controls all create distortions in prices and values which confer extra returns on owners of some assets and reduce the return to owners of other assets. 1/

Market imperfections may be caused by a host of other factors in such a way that returns to assets are distorted. For example, cultural differences often reduce opportunities to earn returns on assets for some cultural and ethnic groups and enhance opportunities for others. The distinction between Chinese and Malay in Malaysia, 2/ Indian and Ladino in Guatemala, Black and White in the United States, and European, Asian, and African tribes in East Africa are some examples. Class distinctions reinforced by school identification, manners, and speech often mark people for the kind of opportunities to which they are likely to have access. Class and ethnic distinctions often determine who has access to information about particular investment opportunities, who receives bank credit when loans are difficult to obtain, introduction-

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1/ Monopoly profits created by foreign exchange controls are discussed by Winston [1970] and Krueger [1974].

2/ Snodgrass [1972] discusses the relation between ethnic groups and income inequality in Malaysia.

to people who can be helpful in making a sale and other limited opportunities. Class and ethnic distinctions are particularly pernicious in that they are reinforcing over time. The more advantaged groups prefer doing business among themselves and essentially restrict entry into more lucrative professions or other lines of business.

VI. Government Taxation and Expenditure

Government taxation and expenditure policies can play a major role in determining the distribution of income. Government taxes can be progressive, in which the rich are taxed relatively more than the poor, or regressive, in which the rich benefit at the expense of the poor. A major problem in determining the net effect of government taxation in altering the distribution of income is the question of incidence. The analysis of incidence of direct taxes on income received is usually straightforward. The more difficult problem arises in determining the incidence of indirect taxes. Is the burden of an excise tax on a commodity, for example, carried by those who purchase the commodity, by the wholesale and retail outlets that sell the commodity, by the firm that produces the commodity, or by the workers of the firm that produces the commodity? 1/

Although the difficulties of determining the incidence of taxation are great, they are surpassed by those of determining the

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1/ See Musgrave [1959] and Rolph [1954] for classic discussions of tax incidence. For a more recent study, see Musgrave and Musgrave [1973].

incidence of government expenditures. There are many relevant aspects of government expenditures to take into account. 1/

One important distinction is between government investment expenditures and government current account expenditures. Current account expenditures involve either general administration of the government bureaucracy or the provision of services to the public, such as defense, police protection, libraries, parks, hospitals, public health measures, public utilities and education. Investment expenditures are those relating to the construction of roads, government buildings, schools, public housing, hospitals, reservoirs and dams, irrigation systems, electricity generating stations, and public water supplies, sewage systems and street lighting. Once the assets created by these investments are in place, they generally provide a stream of public services, usually in conjunction with current expenditures of one sort or another, such as expenditures on teachers, books, and supplies in the case of school buildings or maintenance in the case of roads.

A major question, then, is who benefits from the services provided by government, either directly through current expenditures, or indirectly through services provided by public assets. Some services are usually regarded as being generally available to the public. These include defense, diplomatic representations, and general administration. Other services, however, are thought to benefit only those who avail themselves of the

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1/ For a summary of the literature and issues as they relate to less developed countries, see DeWulf [1974] and McClure [1974]. The best known expenditure study is Gillespie [1965].

services, such as those who attend school, use roads, stay in a hospital or use electricity. It is difficult to assess benefits to users in most cases. The value placed by an individual on a particular government service, theoretically, could be measured by his consumer surplus, but, in practice, is usually measured on a cost-basis. Individuals or groups of individuals are assigned a certain percentage of total use of a service and the benefits measured by applying this percentage to the total cost of providing the service and subtracting user charges. User charges include such things as school fees, tolls on roads, electricity tariffs, rents on public housing and hospital charges. Problems abound:

1) How does one assign percentage use to an individual or group for example, who uses a monument or who benefits from a city park?

2) How are joint costs allocated?

3) Investment costs, as well as current costs, should be included;-- how does one allocate investment costs?

4) How does one determine user costs paid by particular individuals and groups?

In addition to benefit incidence, another important concept is expenditure incidence. Government expenditures involve the hiring of people at government wage scales. If the government tends to pay higher wages than the private sector, or if there is significant unemployment, government expenditures confer benefits on those who are employed. Even under full employment circumstances, the government often exercises such a large influence on labor markets that wages are raised by the government's labor demand.

Government may also be a mechanism for effecting direct transfer payments. For example, social security and workmen's compensation programs involve direct monetary transfers. School feeding and other food distribution programs are very much like transfer payments in kind. The analysis of the income distribution effect of government is more straightforward than that of other kinds of government expenditures.

In this section, we have discussed benefit and expenditure incidence of government activities in the context of traditional public service type activities. Government-owned productive enterprises can be treated much like private enterprises in analyzing their impact on income distribution. Government ownership of productive enterprises may be an efficient means of capturing non-labor incomes, the surplus of those enterprises, for social purposes. Government-owned enterprises may also set policies toward their employees which influence general wage levels and fringe benefits for workers.

VII. Size Distribution of Income Over Time

The size distribution of income by household is a combination of income from human capital assets, physical assets and government taxation and expenditure. Income from assets may either be in the usual form of income i.e., interest, rents, or profits, or in the form of capital gains.

Capital gains income is not usually included in most national accounts definitions of income. Yet some of the highest levels of consumption are financed from capital gains.

The stream of income derived from human and physical assets may vary considerably over time for any individual household. Income will exhibit a life-cycle as random variations from year to year. Thus, at any point in time, an examination of the distribution of income will show a wide dispersion, even if total lifetime income of households were evenly distributed.

The distribution of household income and income accruing to individuals may be quite different. If large households are also low-income households, the distribution of individual income may be even more skewed than that of household income.

The size distribution of income, by family or by household, is affected over the long run by the way in which both human resources and physical assets are passed on from one generation to another. Inheritance customs and inheritance taxes affect the way in which intergenerational transfers occur. The factors which influence income over the average human lifetime, however, may be so strong that inheritance customs and laws have relatively little influence except for a very few of the most wealthy individuals in the population.

VIII. Policy Options

We distinguish four main policy approaches toward making the distribution of income more equal: 1) direct market interventions by government in favor of the poor, 2) confiscation of income or wealth by government, 3) provision of public services for the poor, and 4) government expenditure-oriented policies. A direct market intervention is any attempt by government to control prices and quantities of goods which are available in private markets. Confiscation can take the form of either fiscal expropriation of income or wealth through progressive tax measures or physical confiscation through land reform or nationalisation of industry. The third approach involves the provision of services such as housing, health, education, and water and electricity supplies directly to the poor. Finally, government-expenditure policies are those designed to affect factor prices indirectly, particularly wages paid to the poor, unskilled workers, through government expenditure patterns.

1. Market Intervention

The first approach involves operating on prices or quantities of goods and services available in private markets. Within this general approach, however, there are four different ways to attempt to have the desired effect: 1) through price controls, 2) quantity controls, 3) tax or subsidy incentives, and 4) direct measures to remove market

imperfections. Minimum wage legislation, food price controls, and interest rate ceilings are all examples of direct price controls which affect the distribution of income. Direct quantitative controls are most often used with respect to imports. Imports of luxury goods can be restricted while imports of basic necessities are let in freely. Tax incentives can take many forms. Accelerated depreciation rules and investment allowances affect the private cost of capital; payroll taxes, the cost of labor. Fertilizers, water, and insecticides may be subsidized for the farmer. The prices of crops may be affected by government purchases and stockpiling or by government marketing boards which either run surpluses (thus taxing the farmers and lowering the price which he receives) or deficits (thus subsidizing the farmer and raising the price). Tariffs and excise taxes are other examples of the use of taxes to alter prices. The fourth method of affecting markets is to attempt to break market imperfections. Equal opportunity legislation, enhanced educational opportunities for disadvantaged groups, anti-trust enforcement, and efforts to break restrictive practices among tradesmen and professionals are some of the techniques used.

Extreme examples of market intervention to improve income distribution include a freeze on upper-end wages and salaries. This has occurred among the civil service in Tanzania. In Cuba, most salaries are subjected to a very modest upper limit which prevents large disparities in wage and salary income.

Another approach aimed at alleviating poverty is to provide for each individual, as a matter of right, a basket (*cesta*) of basic

necessities. The theory is that no individual need be deprived of necessities because of inability to pay market prices.

Economists who believe in the utility of using markets usually advise against the use of direct price or quantity controls and in favor of using tax and subsidy measures, or the use of efforts to reduce market imperfections as a tool to modify income distribution. The use of direct price and quantity controls can usually be shown to be inefficient and the same objectives can be accomplished more efficiently by tax and subsidy measures or a reduction in market imperfections.

Income inequalities often arise because of attempts to directly control prices and quantities for reasons other than income distribution objectives. Some inequalities may be reduced by eliminating the controls. A control regime which attempts to keep prices down on mass consumption goods may in fact have adverse income distribution implications because of the effects on supply of these goods and the emergence of black markets. In fact, then, less of controlled commodities at a higher average price may be consumed by the poor, particularly if they have limited access to markets in which prices are effectively controlled and must make more of their purchases in black markets than middle and upper income groups. The same type of problem also arises in connection with controlled credit. Controlled interest rates and allocation of credit results in less credit at higher interest rates for small borrowers, since they must often go into gray or black markets for credit.

The effect of market intervention policies which influence the price of labor and capital can be analysed through a version of the surplus labor model discussed earlier in this essay. Let us assume that there are three sectors rather than just two, informal and modern. In particular, let us assume the existence of a modern sector, an informal urban sector, and an informal, rural sector. There are four different classes of people: 1) modern-sector capitalists, 2) modern-sector workers, 3) urban, informal-sector workers, and 4) rural, informal-sector workers.

Assume that the production function for the modern sector exhibits constant returns to scale, and labor-augmenting and capital-augmenting technical change. It is possible to show (see appendix to this paper) that the rate of growth r_L of the modern-sector labor force is given by

$$(1) \qquad r_L = r_K + r_a - r_b[(1-\sigma)/(1-\alpha)] - \sigma/(1-\alpha)r_W$$

where r_K is the rate of growth of the modern-sector capital stock, r_a is the rate of capital-augmenting technological change, r_b is the rate of labor-augmenting technological change, σ is the elasticity of substitution between capital and labor, α is the share of labor in total output and r_W is the rate of growth of the real wage.

The important thing to note in equation (1) is that increases in the real wage reduce the rate of labor absorption into the modern sector. The amount of this reduction is directly related to

the elasticity of substitution between labor and capital, and to the labor share in total output. The last term in (1), however, excludes only the direct effect of wage increases in the modern sector on employment absorption. To the extent that wage increases reduce profits and profits are the major source of savings and reinvestment, increases in urban wages reduce profits and the rate of capital accumulation, as is equation (1). Thus, there is a deceleration effect of wage increases in the modern sector.

The effect of a wage increase in the modern sector is to increase the incomes of the workers in the modern sector, the success of our four groups of people with whom we are concerned. The per capita income of workers in the modern sector, however, is increased. Workers in the urban, traditional sector may be adversely affected, although they might be slightly better off because of increased migration from the countryside due to the attraction of higher modern-sector wages (see Todaro [1969] and Harris and Todaro [1970]). The migration from the land will increase the marginal and average productivity of rural workers, thus increasing the wage rate according to rural, traditional-sector workers.

The sector which tends to bear the brunt of any reductions in per capita income is the urban, traditional sector. Because of the reduction in the employment creation, fewer workers in this sector are absorbed into the employment ranks in the modern sector. Secondly, the increase in wage rates reduces total output and thus, total income in the modern sector. Since the level of the demand for urban, traditional output is a derived demand which depends on the modern sector activity, the increase in wages

in the modern sector exerts a depressing influence on urban, traditional-sector output. Finally, increased migration from the rural sector to the urban areas may swell the total urban labor force, thus exerting further downward pressure on wages and per capita incomes in the traditional sector.

One can show that the reduction in per capita income of the urban, traditional sector (see appendix) is directly related to the elasticity of traditional-sector output with respect to rural-sector output, the share of labor in total output of the modern sector, the importance of the modern sector relative to the urban, traditional sector, the decrease in the rate of labor absorption into the modern sector and the elasticity of labor migration from the rural to the urban areas.

When modern sector wages increase, the change in the degree of inequality is quite ambiguous--some groups gain, while others lose. The urban poor, in particular, tend to be much worse off. Although those remaining in the countryside may be slightly better off, those who migrate to urban areas may be better off or worse off, depending on whether or not they get high-paying jobs. It is certain that the degree of under-- and unemployment in the urban areas tends to increase. In an economy characterized by the model described here, the poorest segments of the population are not helped in any fundamental way in the modern sector. The lot of the urban poor is made worse and low productivity and poverty in the countryside is transformed into urban poverty and unemployment through migration.

An analysis of those market interventions which affect the price of capital can be made in a similar fashion:

In order to determine the effect of a reduction in the cost of capital, let us assume that the cost of capital affects only the capital-intensity of new investment. Once an investment is made, the cost of capital becomes a fixed cost and is not a factor in determining the capital labor ratio. Ex-ante, however, for a constant elasticity of substitution (CES) production function, the optimal incremental, capital-labor ratio is given by

$$(2) \qquad \frac{dL}{dK} = \left[\frac{\delta}{(1-\delta)} \frac{P_K}{W}\right]^{\sigma}$$

where δ and σ are the distribution and elasticity parameters, respectively, of a CES production function and P_K is the price of capital, interpreted here to mean the price of capital goods.

Suppose that the rate of capital accumulation in money terms is a linear function of profits (π) on existing capital stock. Then, the real rate of capital accumulation is given by

$$(3) \qquad dK = (a+b\pi)/P_K$$

If we substitute (3) into (2) and differentiate, we obtain

$$(4) \qquad \frac{d(dL)}{dL} = (\sigma-1)\frac{dP_K}{P_K}$$

That is, the percentage change in labor absorption on new investment relative to the percentage change in the price of capital depends on the elasticity of substitution.

There are two effects to take into account. First, the reduction of the price of capital results in a substitution of capital for labor which reduces labor absorption. At the same time, a lower price on capital goods makes for more rapid capital accumulation in real terms which increases labor absorption. If the elasticity of substitution is greater than unity, the first effect outweighs the second and labor absorption is reduced when the price of capital goods is decreased.

The effect of a reduction in the price of capital can then be analyzed in terms of the four groups of people. Total modern-sector output and profits increase so that modern-sector entrepreneurs benefit from a reduction in the price of capital. Labor absorption into the modern sector may either increase or decrease, depending on the elasticity of substitution--thus, neither traditional sector can expect to gain much by the opening up of more modern-sector, high-paying jobs. The urban, informal sector may gain somewhat through increased derived demand resulting from increased modern-sector output. The rural traditional-sector and modern-sector wage-earners are unlikely to be much affected at all.

None of this takes into account the fact that the capital subsidies require either increased taxation or inflation in order to effect the implied real resource transfers to capitalists. If these

are taken into account, the rural, traditional-sector and modern-sector wage-earners are likely to be worse off. The small spillover gains made by the urban, traditional sector may be completely vitiated. The big gainers are the modern-sector entrepreneurs.

Manipulation of modern-sector wage rates or subsidization of the cost of capital to modern-sector entrepreneurs are unlikely, then, to make much of a difference in the overall variability of income. Some relatively poor groups gain while others lose, due to secondary effects. In particular, the poorest groups, workers in the traditional sectors, are the greatest losers under policies designed to raise modern-sector wages or reduce the cost of capital to modern-sector entrepreneurs.

2. Confiscatory Policies

Confiscatory policies include taxation, land reform, and nationalization of industry. Progressive taxation is not always very effective. In a poor country only certain segments of the population are likely to be affected by taxation; in particular, government workers and wage and salary earners in the modern sector. Accurate records of wages and salaries are kept regarding these workers, and many less developed countries have instituted a pay-as-you-earn system of wage and salary tax deductions. It is much more difficult to tax non-export agricultural incomes and incomes in the urban traditional sector. It is also difficult to tax most forms of unearned income.

This is especially serious if a major cause of inequality derives from an unequal asset distribution. Unearned incomes are difficult to assess and may easily be hidden enterprise costs in the form of expense allowances, company housing, and company transport.

A more radical approach to income redistribution involves the redistribution of directly productive assets rather than fiscal redistribution. In predominantly agricultural less-developed countries, land redistribution might be the most effective instrument in reducing income disparities. The historical record, however, has not been good. Political opposition in many countries has effectively stalled or severely diluted plans for drastic land reform. Land reform seems to be enacted only more often in the wake of major social upheavals, such as the Communist revolutions in Russia and China, the South after the United States' takeover in Puerto Rico after the Japanese defeat in World War II, the nationalist takeover of Algeria after expulsion of the nationalists from the mainland, the revolutions in Mexico, Cuba, and Bolivia, and the socialist election victory in Chile. Other types of policies which can affect the distribution of income in the rural sector are agricultural credit and marketing policies.

Nationalization as a policy has some of the same drawbacks as land reform. Politically, it is difficult to achieve. Although nationalization may decrease the income of the wealthiest groups, it may increase the disparity in incomes between the modern and traditional sectors, if it leads to higher wages and a slower rate of labor

absorption by the nationalized industries.

A major problem of both land reform and nationalization is that it often does little to help the small peasant, the landless, rural laborer or the urban, traditional worker. Land reform benefits often accrue to wage labor on large scale farms who gain land or are able to increase their share of the surplus, or industrial, modern-sector workers who are able to capture an increased share of industrial profits. Thus, land reform and nationalization chiefly redistribute income from upper to lower and middle income groups within a sector.

Redistribution of assets, if it is to be effective in assisting the lowest income groups, must be horizontal across sectors rather than vertical within the modern sector. Horizontal transfer policies, however, have played a smaller role, and indeed have often been regressive, even in relatively distribution-oriented regimes. Thus, it is not uncommon that countries with very "advanced" labor legislation--which in practice favors modern-sector workers only--have regressive or neutral fiscal systems. Only the more ambitiously egalitarian regimes, such as those of Cuba, Tanzania and China, have created major systems of horizontal redistribution.

Why has redistribution been so much limited to vertical transfers despite the strongly egalitarian principles of many developing countries? One obvious cause is the self-reinforcing political strength of the modern sector--particularly, of bureaucratic and labor groups. Administrative factors are also involved, since horizontal transfers need more intermediation.

A less obvious but also relevant cause is that vertical transfers enjoy a moral support that is not associated with horizontal redistribution. This moral support is expressed, for instance, in the labor theory of value. It is rooted in those notions of justice that link rights to the creation of something of value, rather than to its use in "historical" as against "pattern" or "end-state" principles of justice. 1/ In discussions of the right to property income, the argument often centers on the question of who really produced that income. Both parties are implicitly accepting the distributive claim arising out of the act of production.

By contrast, the ideal of income equality, which is required to sustain policies of horizontal redistribution, and more generally, to separate distribution from production, is a weaker moral precept. Horizontal transfers are more commonly supported by feelings of charity than of justice, and charity is much the weaker of those sentiments. The communist precept--to each according to his needs--remains an ideal for a society of "new men," not a banner for political action today. Most of the indignation provoked by "inequality" is satisfied by removing the extremes in income levels; in poor countries, it amounts to a feeling of scandal at the existence of a few rich amongst the many poor, and leveling down those extremes of wealth can be achieved without horizontal

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1/ This distinction is developed by Robert Nozick [1972].

redistribution. The nature of moral feelings thus reinforces the natural, political and administrative difficulties of achieving horizontal redistribution.

Theoretical models for purposes of analysing income distribution, land reform and nationalization are developed in some detail in papers by Cline, and Selowsky and Cauas in this volume.

3. Provision of Public Services

A third major set of policies to redress income imbalances involves the provision of government services for poor groups. These include such things as (a) investment in feeder roads and village, electric and water supplies in poor rural areas; (b) broadening access to education and expenditures on public health and nutrition; (c) site and service projects in urban areas; (d) birth control information and subsidization of contraceptives for the poor; (e) farmer extension services and subsidized seed; (f) fertilizers and pesticides for small farmers; (g) agricultural and industrial research aimed at improving the productivity of the small farmer or entrepreneur. We classify public works projects as an expenditure-oriented policy in so far as the public works affect employment and wage rates, but the capital assets which result from these projects may provide services for the poor segments of the population.

Two problems arise with respect to public services for the poor. One is that of access. Access to a road, a hospital, a school or a public park, for example, may be limited because of location factors.

A related problem is that of complementarity. Access to public facilities may be limited because of lack of complementary assets. For example, roads are best used by those who have automobiles; hospitals, schools, and parks by those who have a means of transport; farmer extension services, rural feeder roads, input and price subsidies, and irrigation facilities by those who have land. Because of the complementary problem, provision of public services may do nothing more than reinforce existing income disparities. This suggests that redistribution of privately held wealth may be a necessary precondition for other redistribution policies to have the desired effect.[1/]

Alternatively, the state may want to restrict access to public goods. The use of a hospital, for example, may be restricted to only low-income families. Access to irrigation water may be granted only to small farmers. Use of public housing or site and service projects may be restricted to low-income groups. In some cases, it is extremely difficult to identify the poor and to insure that only they have access. In other cases, custom, tradition or social policy dictate that access not be restricted--public schools and roads are usually available to anyone who is able to use them.

Access to public services may be modified by user charges. Often user charges do not cover the full cost of providing an asset. Thus, the user charges have an element of subsidy. Even when user charges cover full costs, there may be an element of subsidy to the user if the service would not be available at any cost, unless the

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1/ Tanzi [1972] maintains that redistribution through government expenditures on public services at best transfers income from the richest to the upper middle class because of limitations of access and complementarity.

government provided the service. The existence of user charges, however, may restrict access by low-income groups who cannot afford even modest user charges. User charges may be determined in a discriminatory fashion as a means of overcoming this problem. Lower-income classes may be charged less. This may be possible in some cases, such as medical care or schools, but not in others, such as road tolls.

4. Expenditure-Oriented Policies

Finally, government may try to increase incomes of the poorest groups by engaging in heavily labor-intensive public works projects. Projects of this sort have two basic goals. The first is to soak-up unemployment, particularly seasonal unemployment. The second is to raise wage levels for the poorest, least-skilled workers.

To the extent that public works projects utilize unemployed workers, they both increase economic efficiency and redistribute income. The increased efficiency makes it possible for the poor to receive more at a cost to the rich which is relatively modest over the long-run because of increased productivity.

Public works may be associated with a rural development program which aims at increasing small farmer productivity. Thus, the program may have both an expenditure effect on wages and employment and a benefit effect. All too often, however, the benefits go, not to the smallest farmers or the landless, but rather to the larger farmers.

Alternatively, public works programs may have an urban focus--such as the building of low-cost public-housing. Like rural public

works, the projects may provide substantial benefits to the poorest groups as well as expenditure effects. The key to expenditure-oriented policies, however, is that they focus on labor-intensive, construction activities.

A related policy is one in which the government serves as an employer of last resort. With this kind of policy, the government offers to hire anyone for some specified minimum wage below the going market wage. One need not be very concerned as to the quality or amount of work performed. In this way the poorest members of the potential work force can receive some minimum level of income. Furthermore, this policy has the advantage of providing a test of how much and how severe is the problem of unemployment by assessing the number of people who offer their services at the government minimum wage.

IX. Conclusions

The various policy alternatives discussed here are dealt with at much greater length in the policy papers in this volume. The analysis of the efficacy of these policies, however, depends greatly on the use of an appropriate model of the inter-relationship between growth and income. The model may vary from country to country. In a highly dualistic economy, policies ought to be aimed at reducing discrepancies between traditional and modern sectors. If windfall gains are a major explanation of the distribution of income, then confiscatory policies might be more effective. Appropriate policies and policy mixes will be summarized and examined in the last essay of this volume with these kinds of relationships in mind.

Mathematical Appendix

by

Henry Bruton and Charles K. Frank, Jr.

In this appendix we specify formally a model of a developing economy which has three main sectors: 1) a modern sector, 2) a rural traditional or informal sector and 3) an urban traditional sector.

Modern sector output Q_m is a function of capital K invested in the modern sector, and employment in the modern sector, L_m.

$$(1) \qquad Q_m = F(K, L_m)$$

The parameters α and β represent capital and labor augmenting technical change, respectively. Both α and β are functions of time.

The modern sector wage rate W is a function of the marginal productivity of labor in the modern sector.

$$(2) \qquad W = F_L$$

We assume that traditional sector output [illegible] sectors Q_u and Q_r, respectively, are each composed of two parts, the first of which is output of the traditional sector consumed by the traditional sector Q_{ut} and Q_{rt}, respectively, and the second of which is output of the traditional sector which is sold to the modern sector as Q_{um} and Q_{rm}, respectively. Thus, for the urban traditional sector,

we have

$$(3) \qquad Q_u = Q_{ut} + Q_{um}$$

and for the rural traditional sector

$$(4) \qquad Q_r = Q_{rt} + Q_{rm}$$

We also assume that traditional sector output consumed by the traditional sector is a constant amount per worker in the urban or rural traditional sector. That is,

$$(5) \qquad Q_{ut} = L_u \cdot S_r$$

and

$$(6) \qquad Q_{ur} = L_r \cdot S_r$$

where L_u and L_r are the labor force employed in the urban and rural traditional sectors, respectively, and S_u and S_r are constants. Traditional sector output produced for consumption by the modern sector, however, is assumed to be a function of the level of modern sector output. That is,

$$(7) \qquad Q_{um} = g_u(Q_m)$$

and

$$(8) \qquad Q_{rm} = g_r(Q_m)$$

The urban labor force is affected by migration from the countryside. As in Todaro [1969], we assume that the urban labor force, $L_m + L_u$, depends on the expected wage E_w which can be achieved in the urban areas. The expected wage is a weighted average of the modern sector wage rate W and per capita income in the urban traditional sector Q_u/L_u.

$$(9) \qquad E_w = (L_m W + Q_u)/(L_m + L_u)$$

The urban labor force is a function then of the difference between the wage in the urban areas and per capita income in the rural areas.

$$(10) \qquad L_m + L_u + h(E_w - Q_r/L_r)$$

The Rate of Labor Absorption

In this model, we assume that the rate of labor absorption into the modern sector is a function of the rate of capital accumulation in the modern sector, the rate of technological change, and the rate of change of the wage rate. The labor absorption function can be derived as follows:

First, let us assume that the production function F in (1) is homogeneous of degree 1. That is, we may have non-constant returns to scale but the production function is still homogeneous. With homogeneity, we may write (1) as

$$(11) \qquad Q_m = (\beta r_m)^{\gamma} f(k)$$

where

$$(12) \qquad f(k) = F(k,1)$$

and

$$(13) \qquad k = \beta K/\beta L$$

Differentiating (11) with respect to L_m, we obtain

$$(14) \qquad \frac{\partial Q_m}{\partial L_m} = \beta(\beta L)^{\gamma-1}[\gamma f(k) - f'(k) \cdot k] = W$$

Multiply (14) through by L_m to obtain

$$(15) \qquad \gamma Q_m - (\beta L)^{\gamma} f'(k) \cdot k = W L_m$$

Differentiate (15) with respect to time and divide through by Q_m.

$$(16) \qquad \gamma \frac{\dot{Q}_m}{Q_m} = \gamma \frac{\dot{\beta}}{\beta} \frac{f'k}{f} + \gamma \frac{\dot{L}_m}{L_m} \frac{f'k}{f} + \frac{f''\dot{k}k}{f} + \frac{f'\dot{k}}{f} + \frac{\dot{W}}{(\beta)^{\gamma-1} L_m^{\gamma-1} f} + \frac{\dot{L}}{\beta^{\gamma-1} L^{\gamma-1} f L_m}$$

Differentiate (11) with respect to time and divide through by Q_m.

$$(17) \qquad \frac{\dot{Q}_m}{Q_m} = \gamma \frac{\dot{\beta}}{\beta} + \gamma \frac{\dot{L}_m}{L_m} + \frac{f'\dot{k}}{f}$$

Differentiate (13) with respect to time and divide through by k.

$$(18) \qquad \frac{\dot{k}}{k} = \frac{\dot{k}}{k} + \frac{\dot{\alpha}}{\alpha} - \frac{\dot{L}_m}{L_m} - \frac{\dot{\beta}}{\beta}$$

Divide (15) by W and Q_m as given by (11). The result is

$$(19) \qquad \frac{1}{\beta L_m^{\gamma-1} f} \quad \frac{\dot{\gamma}}{W} - \frac{f'\dot{k}}{fW}$$

Substitute (17), (18), and (19) into (16) and collect terms.

$$(20) \qquad \left[(\gamma-1)(\gamma-2\frac{f'k}{f}) + \frac{f''k^2}{f}\right]\frac{\dot{L}_m}{L_m} = \left[(\gamma-1)\frac{f'k}{f} + \gamma(\frac{f'k}{f}-\gamma) - \frac{f''k^2}{f}\right]\frac{\dot{\beta}}{\beta} +$$

$$(\gamma-\frac{f'k}{f})\frac{\dot{W}}{W} + \left[\frac{f''k^2}{f} - (\gamma-1)\frac{f'k}{f}\right](\dot{K}/K + \dot{\alpha}/\alpha)$$

One can show that the elasticity of substitution σ can be expressed as [1/]

$$(21) \qquad \sigma = \frac{f'f'k^2 - f'fk}{f''k^2}$$

We may rearrange terms as follows

1/ See R. G. D. Allen [ ], p. 48.

$$(22) \qquad \frac{f'}{f'k^2} = \frac{-\sigma}{\frac{f'k}{f}\left(1-\frac{f'k}{f}\right)}$$

From (15) and (11), we may write

$$(23) \qquad \frac{f'k}{f}\cdot\frac{pY-WL_m}{(pL)\cdot f} = \gamma - \frac{WL_m}{Y}$$

If we let WL_m/Y be denoted by μ, the share of labor in total output, the result is

$$(24) \qquad \frac{f'k}{f} = \gamma - \mu$$

Substitute (22) and (24) into equation (20). The result is

$$(25) \qquad \frac{\dot{L}_m}{L_m} = \frac{(\gamma-\mu)}{\phi}\left[(\gamma-1)(\sigma-1)+\mu\right]\left(\dot{K}/K + \dot{\sigma}/\sigma - \dot{\beta}/\beta\right) - \frac{\mu\sigma}{\phi}\left(\dot{W}/W - \gamma\dot{\beta}/\beta\right)$$

where

$$(26) \qquad \phi = (\gamma-\mu)\left[(\gamma-1)(\sigma-1)+\mu\right] - \mu(\gamma-1)\sigma$$

Equation (25) is the labor absorption function. It gives the rate of labor absorption into the modern sector as a function of the rate of capital accumulation, the rate of capital and labor augmenting technological change and the rate of growth in the wage rate. A couple of special cases are of interest. If there are no economies of scale ($\gamma = 1$)

then the labor absorption function reduces to the following:

$$(27) \qquad \frac{\dot{L}_m}{L_m} = \frac{\dot{K}}{K} + \frac{\dot{\alpha}}{\alpha} - \frac{\dot{\beta}}{\beta} - \frac{\sigma}{(1-\mu)} (\dot{W}/W - \dot{\beta}/\beta)$$

In this case the coefficient of the rate of change of modern sector wages is a simple function of the elasticity of substitution σ and the labor share μ. Even if the elasticity of substitution is less than unity, the wage elasticity of employment may be greater than unity. For example, if the wage share of output is one-half, then employment is wage elastic if the elasticity of substitution is greater than one-half. If the wage share is 80 percent, employment is wage elastic if the elasticity of substitution is greater than 0.2.

Another special case arises when the elasticity of substitution is equal to unity (a Cobb-Douglas production function). Equation (25), the labor absorption function, reduces to

$$(28) \qquad \frac{\dot{L}_m}{L_m} = \frac{(\gamma-\mu)}{(1-\mu)} (\dot{K}/K + \dot{\alpha}/\alpha) + \frac{\mu}{(1-\mu)} \frac{\dot{\beta}}{\beta} + \frac{1}{(1-\mu)} \frac{\dot{W}}{W}$$

The elasticity of employment with respect to both capital accumulation and capital augmenting technological change is greater than unity if there are economies of scale and less than unity if there are decreasing returns to scale. The elasticity with respect to labor augmenting technological change is always positive and greater than unity if the labor share is greater than 50 percent, but less than unity if the

labor share is less than 50 percent. Finally, with the Cobb-Douglas function, the wage elasticity of employment is always greater than unity and varies directly with the wage share of output.

Wage Changes in the Modern Sector and Effects on Per Capita Incomes in the Traditional Sector

In this section we analyze the effect of wage changes in the modern sector on per capita incomes in the traditional sectors. If the modern-sector wage rate rises, then modern-sector workers receive more income. There are a number of adverse effects, however. First, there will be fewer modern-sector workers at high wage levels. Second, per capita income in either the urban or rural traditional sectors is likely to decline when wages are raised in the modern sector.

To determine the effect of a wage change, first differentiate the labor supply function (10):

$$(29) \qquad dL_m + dL_u = \frac{dh}{dD}\,(dE_w - dP_{rt})$$

where

$$(30) \qquad P_{rt} = Q_r/L_r$$

is per capita income in the rural traditional sector and

$$(31) \qquad D = E_w - P_{rt}$$

is the difference between the expected urban wage and per capita incomes in the rural traditional sector. We can also rewrite (29) in terms of the elasticity of supply of urban labor with respect to the urban-rural wage differential.

$$(33) \qquad dL_m + dL_u = e_D \frac{(L_m + L_u)}{(E_w - P_{rt})} (dE_w - dP_{rt})$$

where e_D is the elasticity of urban sector labor force.

In order to determine dE_w and dP_{rt}, we may rewrite (9) and (30) as follows:

$$(34) \qquad (L_m + L_u)E_w = (L_m W + Q_u)$$

$$(35) \qquad L_r P_{rt} = Q_r$$

and differentiate each implicitly. We obtain [note that $dL_r = -(dL_m + dL_u)$]

$$(36) \qquad dE_w = [W dL_m + L_m dW + dQ_u - (dL_m + dL_u)E_w]/(L_m + L_u)$$

and

$$(37) \qquad dP_{rt} = [dQ_r + (dL_m + dL_u)P_{rt}]/L_r$$

Note, also, by substituting (5) and (6) into (3) and (4) and differentiating, we get

$$(38) \qquad dQ_u = S_u dL_u = dQ_{um}$$

$$(39) \qquad dQ_r = S_r dL_r + dQ_{rm} = -S_r(dL_m + dL_u) + dQ_{rm}$$

Furthermore, from (7) and (8), we have

$$(40) \qquad dQ_{um} = e_{um}\frac{Q_{um}}{Q_m} dQ_m$$

$$(41) \qquad dQ_{rm} = e_{rm}\frac{Q_{rm}}{Q_m} dQ_m$$

where e_{um} is the elasticity of urban traditional-sector output and e_{rm} is the elasticity of rural traditional sector output with respect to modern sector output. From equations (1) and (2), we have

$$(42) \qquad dQ_m = F_L dL_m = W dL_m$$

Finally, from (27), we can deduce the change in employment in the modern sector given a change in the modern-sector wage rate (holding capital stock and technical change constant).

$$(43) \qquad dL_m/L_m = -(\mu\sigma/\phi)(dW/W)$$

Combining equations (36) through 43), substituting into (33), and rearranging terms, we obtain [assuming constant returns to scale in which case $\gamma = 1$ and $\phi = \mu'(1-\mu)$]:

$$(44) \qquad (dL_m + dL_u) = \frac{e_D L_m}{\eta(1-\rho)}\left\{W(1-\rho) - \sigma[W(1+\xi)-S_u]\right\}\frac{dW}{W}$$

where

$$(45) \qquad \eta = (E_W - P_{rt}) + e_D(E_W - S_u) + e_D\frac{(L_m + L_u)}{L_r}(Q_{rm}/L_r)$$

and

$$(46) \qquad \xi = [e_{um}L_r Q_{um} - (L_m + L_u)e_{rm}Q_{rm}]/L_r Q_m$$

Equation (44) gives an expression for the change in the total urban labor force, both modern sector and traditional sector, as a function of the change in the modern-sector wage rate. The change in the rural traditional-sector labor force is simply the same expression with the opposite sign.

It is not clear whether the urban labor force will increase or decrease (i.e. whether there will be net migration from urban to rural areas) if there is an increase in the modern-sector wage rate. Note that the term ξ in (45) would be expected to be positive in that the expected wage is likely to exceed the per capita income in the rural traditional sector (P_{rt}) and per capita subsistence income in the urban traditional sector. Thus the sign of the expression in (44) depends on the sign of the terms in brackets and this sign is ambiguous. The

term ξ is a weighted difference of derived demand elasticities, e_{rm}, and e_{um}, and may be positive or negative. Some of the other terms in brackets are positive and others are negative. The ambiguity arises because, on the one hand, the increase in the wage rate raises the expected urban wage. The induced reduction in modern sector employment, however, throws more urban workers into the urban traditional sector which pays less than the modern sector. This latter effect tends to depress the expected wage. If the expected wage increases, there is migration from the rural to urban area, the amount depending on the elasticity of labor supply e_D with respect to the urban-rural wage differential.

The percentage change in per capita income in the rural traditional sector is the difference between the percentage change in output and the percentage change in the rural-sector labor force. That is,

$$(47) \qquad \frac{dP_{rt}}{P_{rt}} = \frac{dQ_r}{Q_r} - \frac{dL_r}{L_r}$$

From (39), we have

$$(48) \qquad \frac{dP_{rt}}{P_{rt}} = \frac{S_r dL_r}{Q_r} + \frac{dQ_{rm}}{Q_r} - \frac{dL_r}{L_r}$$

From (41), (42), (43) and (44), we may write

$$(49)\qquad \frac{dP_{rt}}{P_{rt}} = \frac{L_m Q_{rm}}{L_r Q_r (1-\mu)} \left\{ e_D W(1-\mu) - \sigma[W(1+\xi) - S_u] e_D - \sigma h e_{rm} \frac{WL_r}{Q_m} \right\} \frac{dW}{W}$$

The sign of the expression in (49) can be presumed generally to be negative; that is, an increase in the modern sector wage rate reduces per capita income in the rural traditional sector. This results from the fact that there is a reduction in modern sector output due to higher wages and reduced derived demand for modern sector output; at the same time the rural traditional-sector work force is unlikely to change by much. The derived demand effect is represented by the last term in brackets in equation (49) and the labor force effect by the other terms in the brackets. If there is no net migration (all terms in the brackets in (49) except the last term equal to zero) then per capita income is certain to fall. If there is enough net migration to urban areas, per capita incomes in the traditional rural sector may not fall.

The expression for the percentage change in per capita income of the urban traditional sector can be derived in a similar fashion. First, we solve (44) for dL_u, substituting the expression (43) for dL_m. After collecting terms we obtain:

$$(50)\qquad \frac{dP_{ut}}{P_{ut}} = \frac{L_m Q_{um}}{L_u Q_u (1-\gamma')} \left\{ -e_D W(1-\gamma') + \theta[W(1+\xi)-S_u]e_D \right.$$

$$\left. - \theta\eta(1+e_{um}WL_u/Q_m) \right\} \frac{dW}{W}$$

Here, again, the most likely sign for the expression in (50) is negative; i.e., the result of an increase in the modern sector wage rate is a reduction in the per capita income in the urban traditional sector. But the likelihood of a reduction in the urban sector is even greater than in the rural sector. The increased wage reduces employment in the modern sector and adds to the pool of workers in the urban area which must seek a livelihood in the traditional sector. At the same time there may be migration from rural to urban areas, further adding to the labor pool. Finally, the reduction in modern sector output reduces demand for urban traditional-sector products. The combined effect of reduced demand for output and increased supply of workers tends to reduce per capita incomes in the urban traditional sector.

The only case in which per capita output might rise is if the expected urban wage is reduced and supply of workers to urban areas is elastic enough that there is substantial net outmigration to rural areas. In this case per capita incomes in the urban traditional sector might not fall but it will certainly be reduced in rural areas. In any case, the tendency is for per capita incomes to fall in both urban and rural traditional sectors and certainly in one or the other of the two sectors.

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