

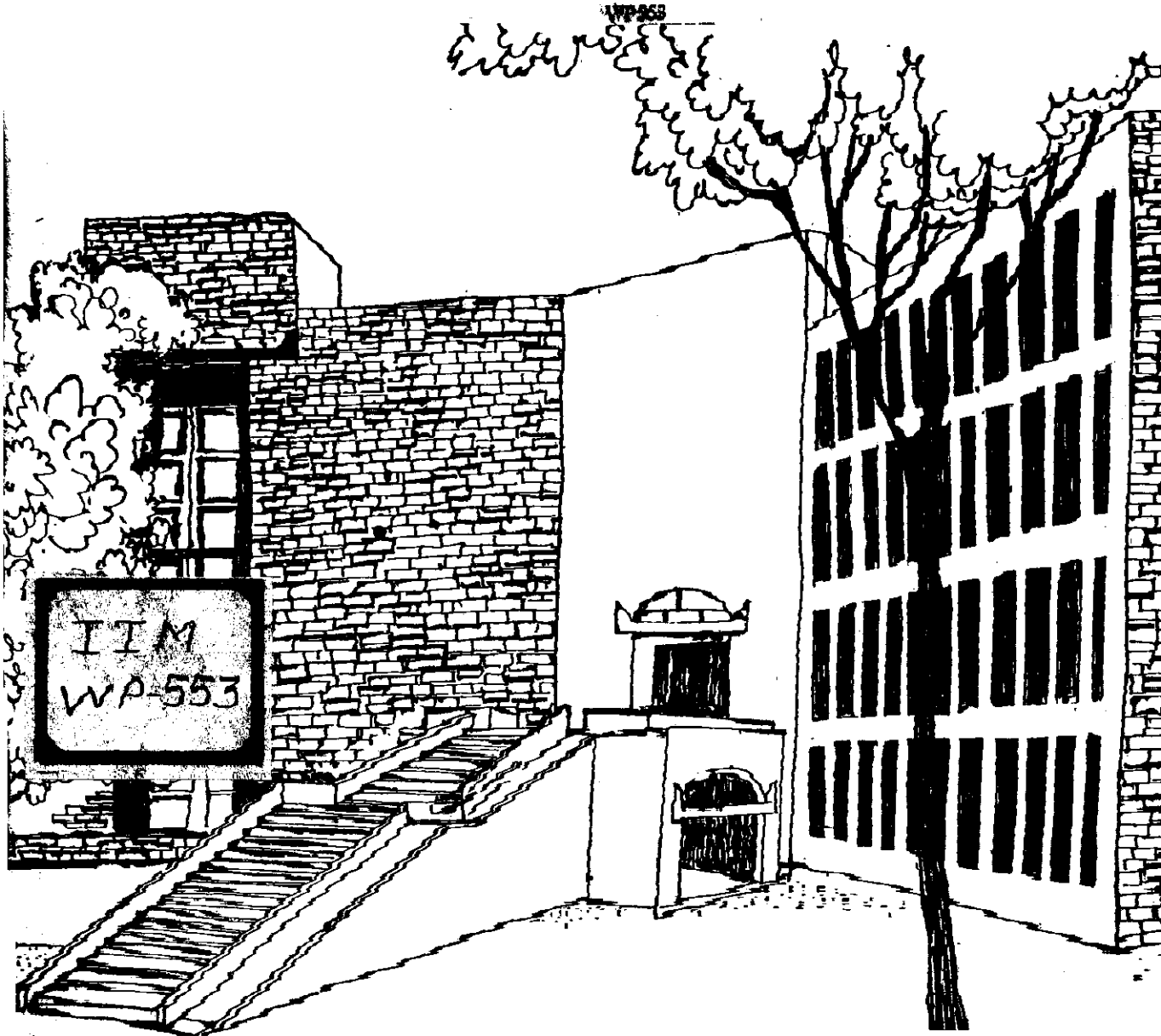


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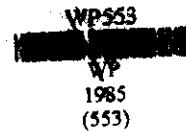
POVERTY, INEQUALITY AND DEVELOPMENT IN DUAL
ECONOMIES WITH URBAN INFORMAL SECTORS

By

Arindam Das-Gupta

&

Ira N. Gang



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INDIAN INSTITUTE OF MANAGEMENT
AHMEDABAD-380015
INDIA

ABSTRACT

In this paper a general model of dualistic economies with urban informal sectors is proposed. The model is able to encompass a wide variety of distortions and institutional features which may affect such economies. Within this framework the two types of dualism, modern and traditional sector dualism, are distinguished and the implications of development patterns and productivity enhancing development policies for distribution are examined. It is shown that traditional sector enrichment growth has the most favourable distribution and growth implications regardless of the type of dualism present. However, productivity enhancing development policies may have implications which lead to undesirable distributional and growth consequences even if they ostensibly promote growth in a desired target sector in a general equilibrium setting.

Poverty, Inequality and Development in Dual Economies with Urban Informal Sectors.

Arindam Das-Gupta, IIM, Ahmedabad, India and Ira N. Gang, Pitzer College and Claremont Graduate School, Claremont, USA.

1. Introduction

This paper has three objectives. The first is to develop a general yet tractable framework for the analysis of dual economies with urban informal sectors. The second is to examine the relation between patterns of development and income distribution in dual economies. The third is to demonstrate the following proposition: "economic growth lead by sector x" is not necessarily the same thing as "accelerated investment (or technical change or increased efficiency) in sector x" In particular the two situations, we show, may have widely divergent spillover effects to other sectors and distributional effects.

The framework developed for this analysis draws closely on the work of pioneering authors, as for example Lewis (1954), Fei and Ranis (1961) and Harris and Todaro (1970) but successfully overcomes several criticisms levelled against these models. For example, the Harris-Todaro model which is by now widely accepted as a description of dual economies, and its variants⁽¹⁾ has been criticized on several grounds (see for example

(1) A partial listing of papers would include Todaro (1969), Harris and Todaro (1970), Sen (1975), Bhagwati and Srinivasan (1974), Khan (1979), Bhatia (1979), Corden and Findlay (1979), Fields (1974), Zarembka (1972) Neary (1981), McGool (1982), Das (1982), Bartlett (1983), Gang (1983), Blomquist (1978), Gang and Gangopadhyay (1983a, 1983b), Das-Gupta (1984), Das-Gupta and Gang (1985). For a Survey see Yap (1975). For a critique of the dual economy hypothesis see Bertrand and Squire (1980).

Sen (1975), Fields (1975), Bhatia (1979), Stiglitz (1974) and Majumdar (1979)). Among the major criticisms are the following

- (1) The perfect random job turnover in the modern sector implied by the labour market equilibrium condition (See Stiglitz (1974) and Fields (1974)).
- (2) The neglect of possible risk aversion on the part of prospective rural to urban migrants. In general, the neglect of expected utility of income maximization (See Sen (1975), Corden and Findlay (1975) and Bhatia (1979)).
- (3) The neglect of the urban informal of 'murky' sector (See Fields (1974), Majumdar (1979), the ILO, Kenya Report (1972) and Heady (1981)).
- (4) The completely voluntary nature of urban unemployment implicit in the model.

Recent attempts to model behaviour of workers, in particular in the traditional sector, have also diverged on the issue of the exact type of behaviour and wage determination. This divergence has its origins in celebrated paper of Sen (1966). Recent contributions of interest are by Bhatia (1979) and Gang and Gangopadhyay (1983a, 1983b).

The model we propose is general enough to overcome all these criticisms and encompass most reasonable types of wage determination rules while remaining tractable.

The rest of the paper is organized as follows. In section 2, we present the framework and discuss its salient features. In section 3 we examine the distributional impact of growth strategies following the excellent methodology of Fields (1980). The analysis of section 3 is meant to clarify the distributional implications of strategies in a partial setting without permitting general equilibrium responses. In section 4

we provide a complete analysis of development policies on labour incomes and their distribution. Section 5 contains a summary and our conclusions.

In section 3, we demonstrate that several of the results of Fields (1980) as to growth strategies and inequality fail to hold up in our more general setting. In particular his "modern sector growth" has distributional implications that are far more detrimental than his conclusions indicate. In Section 4 our results show that the cause of dualism-whether traditional or modern sector has an important bearing on the effects of public policy.

2. A model of dual economies with urban informal sectors⁽²⁾

The model to be developed may be motivated as follows. The basic Harris-Todaro (1970) labour market equilibrium condition is given by

$$W_T = \frac{L_M}{L_M + L_U} W_M + \frac{L_U}{L_M + L_U} W_U \quad 2.1$$

Here W_i stands for the wage rate in sector i ; T is the traditional sector, M is the modern sector and U is the urban sector. L_i is the labour employed in sector i . All wages are measured in units of the wage good (and, in what follows, a small country assumption will be made and the sectoral terms of trade set equal to unity) and the total labour force is fixed. Units of labour are chosen so that the total labour force is unity:

$$L_M + L_T + L_U = 1 \quad 2.2$$

(2) Throughout this paper, lower case letters represent logarithmic differentials of the variables denoted by the corresponding upper case letters. Greek letters are used elasticities. Numerical subscripts denote derivatives with respect to the corresponding arguments.

As is usual we maintain the assumption that

$$w_M \geq w_T \geq w_U \tag{2.3}$$

Rearranging 2.1 and using 2.2 we conclude that

$$W_T \cdot 1 = W_M L_M + W_T L_T + W_U L_U \equiv HT \tag{2.4}$$

Thus the Harris-Todaro hypothesis can be restated as follows: The average wage is equal to the traditional sector wage and further, 2.3 holds. When viewed this way, a simple generalization of this condition at once suggests itself. The following equation is clearly an identity:

$$DW_T = W_M L_M + W_T L_T + W_U L_U, D > 0 \tag{2.5}$$

In view of 2.3 and since $w_M L_M + w_U L_U$ cannot be negative for dual economies we may add the restriction.

$$W_M/W_T \geq D \geq \text{MIN} (W_U/W_T, L_T) \tag{2.6}$$

The model we propose has 2.5 and 2.6 as its central features. Before postulating an equation for D we first attempt to see the implications of worker behaviour for values of D. First consider risk averse workers. Since w_T is typically less risky (in the sense of Rothschild and Stiglitz) than HT, risk aversion should imply $w_T < HT$. That is, ceteris paribus, risk aversion implies $D > 1$. Next consider less than complete random job turnover, so that the expected urban wage is less than HT. If workers migrate till the traditional wage equals the expected urban wage, we once again have $w_T < HT$ and $D > 1$.

Finally consider the phenomenon of 'push' migration instead of 'pull' migration. By 'push', migration we mean a situation in which workers migrate even if the expected utility of traditional sector income exceeds

that of modern sector income. For risk neutral workers, push migration would imply

$w_T > HF$ or $D < 1$ if we neglect other factors (3)

We may therefore conclude that, with D free to vary as in 2.6, a much more general description of labour market behaviour is obtained as compared to existing models in the literature.

Turning to the determinants of D , we first note that we wish to study the way in which D changes in response to changes in wage rates and employment. With unchanged wages and employment D will be determined by the institutional and behavioural factors outlined above. (4)

We set up two alternate theoretical structures in order to close the model. The first structure, which we term Modern Sector Dualism is in broad accord with the Harris-Todaro paradigm in its most general form. However, recent studies, in particular Joshi and Joshi (1976) and Mazumdar (1979 and 1981) have called into question the validity of expected wages being considered a key determinant of migration. Instead, they propose differing reservation wages in the traditional sector as the explanation for the existence of urban wage differentials on the basis of their empirical work.

(3) Unfortunately $D < 1$ does not serve as a test of 'push' migration. It may also be a consequence of 'bright city lights' attracting rural migrants. More generally, we can make the following statement. D will be lower (higher) whenever a positive (negative) externality is present in the modern sector and/or whenever a negative (positive) externality is present in the traditional sector, ceteris paribus. See Heady (1981) for some related points.

(4) Or migration costs or urban to rural remittance possibilities or any of several other factors.

(Reservation wages may differ, for example, on account of discrimination or urban 'contacts', even when rural incomes are the same. A low mean job search duration in urban areas and, in some cases (Mazumdar, 1981) a higher proportion of recent migrants in high wage occupations is often cited as evidence. We are thus faced with a situation which is reminiscent of the Lewis-Fei-Ranis Traditional Sector Dualism hypothesis, albeit with a range of reservation wages.⁽⁵⁾ We examine the implications of this form of dualism in our second variant.

(a) Modern Sector Dualism. For a given set of institutional conditions D should decrease if the expected wage increases and vice versa. Thus, letting I stand for a vector of institutional characteristics, we have

$$D = F(W_M, W_U, L_M, L_U, I) = D(W_M, W_U, L_M, L_U),$$

$$D_1, D_2, D_3 < 0; D_4 > 0 \quad 2.7$$

To complete the model we add the following three equations.

$$W_M = W_M(L_M, V_M); W_{M1} \leq 0; W_{M2} > 0; \quad 2.8$$

$$W_T = W_T(L_T, V_T); W_{T1} \leq 0; W_{T2} > 0; \quad 2.9$$

$$W_U = W_U(L_U, W_M L_M, V_U); W_{U1} \leq 0; W_{U2} \geq 0, W_{U3} > 0. \quad 2.10$$

Equations 2.8 and 2.9 are respectively the wage determination equations for the modern and traditional sectors. Given normal production functions and most types of surplus labour assumptions in the literature, along with

(5) See Bertrand and Squire (1980) for a discussion of Modern Sector versus Traditional Sector Dualism. For additional work on the informal sector see Papola (1981), Sethuraman (1981) and Aziz (1984).

a wide variety of wage determination rules (including marginal/average product being equal to the wage rate) we observe that W_{M1} and W_{T1} will be non positive. Thus 2.8 and 2.9 are general specifications of the wage-labour relationship in the economy. V_M and V_T are policy parameters and may be thought of as representing capital, technology levels or managerial abilities. Turning to 2.10, we assume that demand for informal sector workers is positively (or non negatively) related to the total economic size of the modern sector which is proxied by $W_M L_M$. However, ceteris paribus, an increasing supply of persons to the informal sector causes informal sector earnings to decline (or remain constant). V_U is once again a policy parameter which permits an analysis of informal sector development strategies. To close the model we invoke the usual exogeneity of the modern sector wage rate so that

$$W_M = \bar{W}_M \quad 2.11$$

(b) Traditional Sector Dualism

For a given set of institutional features, we may think of a distribution of reservation wages with DW_T representing the mean reservation wage. Since persons with the lowest reservations wage will migrate earliest we may thus conclude that $D > 1$. Also with additional outmigration from the traditional sector we will have D increasing in this case. Our specification of this model thus has

$$D = F(L_T, I) = D(L_T), \quad D_1 < 0. \quad 2.12$$

To close the model we assume

$$W_T = W_T(V_T), \quad W_{T1} > 0; \quad 2.13$$

$$W_M = W_M(L_M, V_M), \quad W_{M1} < 0; \quad W_{M2} > 0; \quad 2.8$$

$$W_U = W_U(L_U, W_M L_M, V_U), \quad W_{U1} < 0, \quad W_{U2} > 0, \quad W_{U3} > 0; \quad 2.14$$

$$L_U = L_U(W_U), \quad L_{U1} > 0. \quad 2.15$$

We retain the structure of the earlier model except that we now assume that labour supply to the informal sector is positively related to the wage rate instead of passively adjusting. That is, in the spirit of Lewis-Fei-Ranis we treat the traditional sector as the surplus labour absorbing sector. Note that, 'push migration' is not ruled out by this model: while on average D may exceed unity, it may still fall short of unity for some migrants (i.e. they may have a reservation wage less than W_T).

Following Fields (1980) and Das-Gupta (1983) we study institutional inequality among identically endowed individuals by examining the Lorenz Curve for labour incomes. The Labour Curve connects the points $(0,0)$, $(L_U, W_U L_U / DW_T)$, $(1-L_M, 1 - \frac{W_M L_M}{DW_T})$ and $(1,1)$. The three segments of the Lorenz $\frac{DW_T}{DW_T}$ Curve have slopes given by (from left to right) W_U / DW_T , $1/D$ and W_M / DW_T respectively (see figure 2.1).

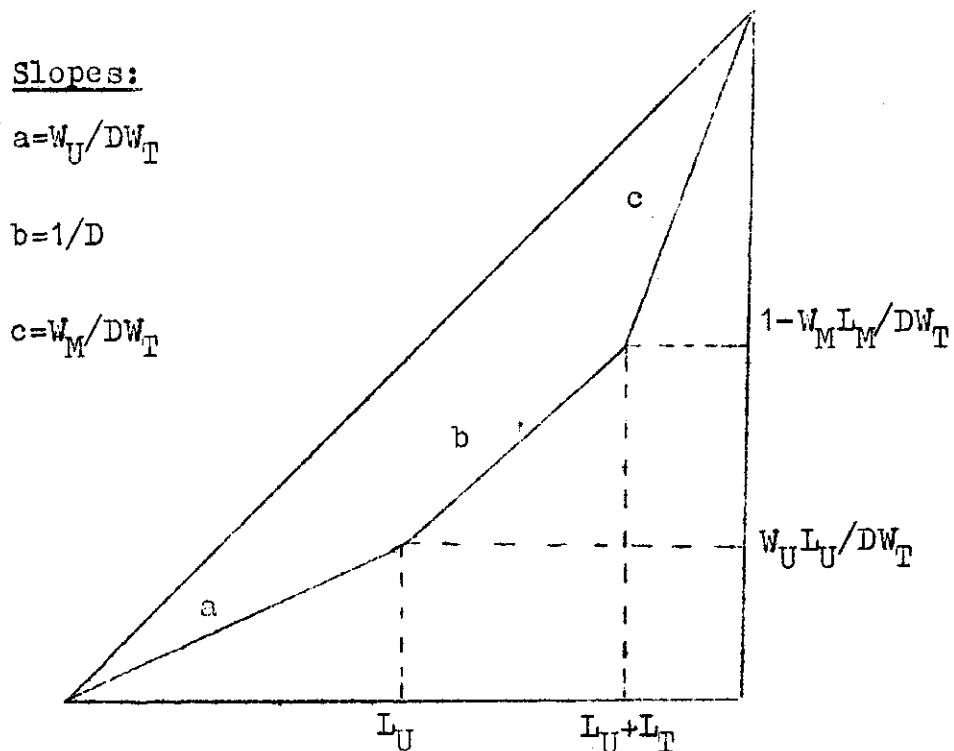


Figure 2.1. The Lorenz Curve in Dual Economies with Identically Endowed Individuals.

We assume that informal and traditional sector workers (or some fraction of them given a constant intrasectoral income dispersion) are poor. Fields (1980) assumes traditional sector workers to be in poverty in a framework which does not account for the informal sector so that our assumption is in accord with his. Following him we consider the generalized poverty index P defined in 2.13.

$$P = P(W_U, W_T, L_U, L_T); P_1 \leq 0, P_2 \leq 0; P_3 \geq 0, P_4 \geq 0. \quad 2.13$$

Instead of working with P however we prefer to use the following criterion.

Definition 2.1 Poverty will be said to decrease if and only if $dL_U \leq 0$, $dL_T \leq 0$; $dW_T \geq 0$ and $dW_U \geq 0$ with at least one strict inequality.

Clearly, P decreases if poverty decreases according to Definition 2.1 (but not necessarily vice versa).

We are now ready to use our framework to analyse the relation between development strategies and income distribution.

(3) Consequences of Development patterns for income distribution

In Fields (1980) the following illuminating typology of development patterns is proposed.

(1) Modern Sector Enlargement (MSE): ".....in the modern sector enlargement growth model, incomes in both the modern and traditional sector remain the same, but the modern sector gets bigger." (Fields (1980), p.52).

(ii) Modern Sector Enrichment (MSR) "In modern sector enrichment growth, incomes in the modern sector rise while incomes in the traditional sector and the allocation

of the labor force between the modern sector and the traditional sector remain the same" (Fields (1980), p.50).

(iii) Traditional Sector Enrichment (TSR): "In the traditional sector enrichment growth model incomes in the traditional sector are assumed to rise, incomes in the modern sector remain the same, and the allocation of the labor force between the two sectors also remains the same!" (Fields (1980), p.47).

He analyses the distributional consequences of these development strategies in a model which is given by our equations 2.2 and 2.5 except that L_U and W_U are assumed to be identically zero. Following him, we have the following definition.

Definition 3.1 We will say that

- (i) TSR takes place if and only if $dW_T > 0$; $dL_M = dL_T = dW_M = 0$
 - (ii) MSR takes place if and only if $dW_M > 0$; $dL_M = dL_T = dW_T = 0$
 - (iii) MSE takes place if and only if $dW_M = dW_T = 0$ and $dL_M > 0$.
- Further, with MSE if $dL_T \neq 0$ and $dL_U < 0$ we will denote this by MSEU and if $dL_T < 0$ but $dL_U = 0$ we will denote this by MSET⁽⁶⁾

In Fields' analysis there are two equations and 5 variables (W_M, W_T, L_M, L_T and D) Thus, his definitions of growth patterns permit him to uniquely determine movements in all 5 variables. To obtain such uniqueness in our framework for TSR, MSR, MSEU and MSET, we require an additional equation over and above 2.2 and 2.5. The obvious choice is 2.7 or 2.12. We thus analyse the impact

(6) Note that the MSEU is may be equally well called informal sector contraction and MSET traditional sector contraction.

of development patterns in the context of 2.2, 2.5 and 2.7 or 2.2, 2.5 and 2.12.

(a) Modern Sector Dualism

In logarithmic differential form, 2.2, 2.5 and 2.7 equations may be written as ⁷

$$L_M^1 l_M + L_U^1 l_U + L_T^1 l_T = 0. \quad 3.1$$

$$d + w_T = S_M(w_M + l_M) + S_T(w_T + l_T) + S_U(w_U + l_U). \quad 3.2$$

$$d = -\alpha_M^1 l_M + \alpha_U^1 l_U - \beta_M^w w_M - \beta_U^w w_U. \quad 3.3$$

where

$$S_i = W_i L_i / DW_T, \quad i = T, M, U, \quad \sum S_i = 1.$$

$$\alpha_i = \left| \frac{\partial D}{\partial L_i} \right| L_i / D \quad i = M, U.$$

$$\beta_i = \left| \frac{\partial D}{\partial W_i} \right| W_i / D \quad i = M, U.$$

If we solve (3.1)-(3.3) for w_T we get

$$w_T = x_M^w w_M + x_U^w w_U + z_M^l l_M - z_U^l l_U, \quad 3.4$$

where

$$x_i = (\beta_i + S_i) / (S_M + S_U) > 0, \quad i = M, U,$$

$$z_M = (S_M + \alpha_M - L_M S_T / L_T) / (S_M + S_U) > 0 \text{ and}$$

$$z_T = (-S_U + \alpha_U + L_U S_T / L_T) / (S_M + S_U).$$

Using 3.1, 3.3 and 3.4 we may derive the following results (See Table 3.1 for computed elasticities).

- Proposition 3.1 (a) With TSR, absolute income rises, poverty and inequality decreases or Lorenz Curves cross.
 (b) With MSR, poverty and inequality increase and absolute income may rise or fall.
 (c) With MSR poverty and inequality increase and absolute income may rise or fall.

7. We neglect the possibility of derivatives being exactly equal to zero in the analysis.

Proof: See Table 3.1 for elasticities. Also, note that the slopes of the first, second and third segments (from left to right in Figure 2.1) increase, remain unchanged or decrease as the expressions $w_U - d - w_T$, $-d$ and $w_M - d - w_T$ are positive zero or negative.

- (a) For TSR, labour allocations are unchanged and $w_U - d - w_T \gtrless 0$, $-d > 0$ and $w_M - d - w_T = -d - w_T < 0$. Thus Lorenz Curves may cross if w_U is small enough which requires $U \gg S_U$. The rest of the assertions may easily be verified from Table 3.1.
- (b) For MSR we have $w_U - d - w_T = w_U - d < -d < w_M - d$ regardless of the sign of d . Since labour allocations are unchanged we therefore conclude that $w_U - d < 0$ and $w_M - d > 0$ (if $w_M - d \leq 0$, then the first and second segments must have decreasing slopes which is impossible. Likewise if $w_U - d \geq 0$, the second and third segments must have increasing slopes which is, again, impossible). The rest of the assertions are obvious from Table 3.1.
- (c) For MSEU or MSEP, the Lorenz Curve slopes change by $w_U - d$, $-d$ and $-d$ where $w_U - d < -d$. If $w_U - d \geq 0$ then all three slopes must increase which is impossible regardless of whether $l_U < 0$ or $l_T < 0$. The other results are straight forward.

TABLE 3.1 : Development Patterns and Wage, Employment and Premium Elasticities: Modern Sector Dualism

<u>Variable</u>	<u>Development Pattern</u>			
	TSR	MSR	MSET	MSEU
l_M	0	0	l_M	l_M
l_T	0	0	$-L_M l_M / l_T$	0
l_U	0	0	0	$-L_M l_M / l_U$
w_M	0	w_M	0	0
w_T	w_T	0	0	0
w_U	w_T / x_U	$-x_M w_M / x_U$	$-z_M l_M / x_U$	B
d	$-\beta_U x_U / w_T$	$\frac{(\beta_U S_M - \beta_M S_U) w_M}{(S_M + S_U)}$	$\frac{(\beta_U z_M - x_U \alpha_M) l_M}{x_U}$	Δl_M
$d+w_T$	$(S_U + \beta_U S_T) / (\beta_U + S_U)$	d	d	d

Note: $\Delta = \frac{\beta_U (L_U S_M - S_U L_M) - S_U (\alpha_U L_M + \alpha_M L_U)}{L_U (\beta_U + x_U)}$; $B = \frac{-l_M (z_U z_M + z_U l_M)}{L_U x_U}$

This may be contrasted with the results obtained by Fields (1980)

Proposition 3.2 (Fields):⁸ (a) TSR leads to higher income, less inequality and poverty.

(b) MSR leads to higher income, more inequality and no change in poverty.

(c) MSE leads to higher income, less poverty and crossing Lorenz Curves.

We see that Fields is vindicated only in four out of nine counts. In particular, all his results for modern sector

8. We restate his Proposition 1-3, pages 47-52 of Fields (1980). For original statements see the source cited. Since his model does not distinguish between sources of dualism, see also proposition 3.4

enlargement are seen to be incorrect if informal sector responses are allowed for with modern sector dualism. In order to round out our picture of dual economy models one would like to examine the distributional implications of development patterns in the Harris-Todaro framework which is given by 2.2 and 2.3 with $W_U = 0$ and $D = 1$. The first point to note is that the Harris-Todaro structure does not permit the growth patterns of definition 3.1 without violating one or another equation! If we start with

$\bullet_T > 0$ or $\bullet_M > 0$ or $l_M > 0$ then we have the following modified definition of TSR, MSE and MSR.

Definition 3.2 In the Harris-Todaro model we will say that (a) TSR occurs if and only if $\bullet_T > 0$, $\bullet_M = l_T = 0$;
(b) MSR occurs if and only if $\bullet_M > 0$, $\bullet_T = l_M = 0$;
(c) MSE occurs if and only if $l_M > 0$, $\bullet_M = \bullet_T = 0$.

That is, we define enrichment growth patterns holding the size of the enriched sector and the wages in the other sector constant. The definition of MSE is unchanged. This procedure, in which we relax one of the three equality conditions of Definition 3.1 appears to be closest to the spirit of the Fields exercise.

The following result is then easily seen to hold.

Lemma 3.1 In the Harris-Todaro framework

- (a) TSR causes L_M to increase and L_U to decrease.
- (b) MSR causes L_M to decrease and L_U to increase.
- (c) MSE causes both L_M and L_U to increase.

We can now state the following proposition:

Proposition 3.3. In the Harris-Todaro framework:

- (1) TSR leads to rising absolute incomes, decreasing poverty, and decreasing inequality.

- (2) MSR lead to unchanged absolute income, increasing poverty and increasing inequality.
- (3) MSE leads to unchanged absolute incomes, uncertain poverty effects and increasing inequality.

The proof of this proposition is left to the interested reader. Comparing Proposition (3.3) to (3.1) we see that the effect of the stronger Harris-Todaro assumptions is to remove some of the ambiguities in Proposition 3.1 (Since Definition 3.2, if applied to the general model, is clearly weaker than Definition 3.1). This is strong testimony as to the robustness of the Harris-Todaro framework and suggests its adequacy for most analytic exercises where the informal sector is not crucial.

As a final point, we note a striking conclusion revealed by Table 3.1: Modern Sector growth leads to impoverishment of informal sector workers while traditional sector growth has the opposite effect. This is, of course, obvious on reflection, given the impact of each type of growth on the premium D.

(b) Traditional Sector Dualism

Logarithmic differentiation of 2.2, 2.5 and 2.12 give us

$$L_M l_M + L_U l_U + L_T l_T = 0 \tag{3.1}$$

$$d + w_T = S_M (w_M + l_M) + S_T (w_T + l_T) + S_U (w_U + l_U) \tag{3.2}$$

$$d = -\alpha_T l_T \quad \alpha_T = \left| \frac{\partial D}{\partial L_T} \right| \frac{L_T}{D} \tag{3.5}$$

Proceeding as before, we get

$$w_T = a_M w_M + a_U w_U + b_M l_M - b_U l_U \tag{3.6}$$

where $a_i = S_i / (S_M + S_U)$ $i = M, U$, $\sum a_i = 1$

$$b_M = (S_M - \alpha_T - L_M S_T / L_T) / (S_M + S_U) \begin{matrix} \geq 0 \\ < \end{matrix}$$

$$b_U = -(S_U - \alpha_T - L_U S_T / L_T) / (S_M + S_U) > 0$$

Once again we banish tediously derived elasticity formulae to a table (Table 3.2) and state the main results in a proposition:

Proposition 3.4: With traditional sector dualism,

- (a) TSR results in less inequality and poverty and higher absolute income.
- (b) MSR results in greater inequality and poverty and no change in output.
- (c) MSE results in lower poverty by the head count measure but other effects depend on whether traditional or informal workers decrease. If informal sector labour decreases then inequality increases, output is unchanged.

TABLE 3.2 Development Patterns and Wage Employment and Premium Elasticities: Traditional Sector Dualism

Variable	Development pattern			
	TSR	MSR	MSET	MSEU
l_M	0	0	l_M	l_M
l_T	0	0	$-L_M l_M / L_T$	0
l_U	0	0	0	$-L_M l_M / L_U$
w_M	0	w_M	0	0
w_T	w_T	0	0	0
w_U	w_T / α_U	$-a_M w_M / \alpha_U$	$-b_M l_M / \alpha_U$	$-(S_M L_U - S_U L_M + (L_M - L_U) \alpha_T) l_M /$
d	0	0	$\alpha_T L_M l_M / L_T$	0
$d + w_T$	w_T	0	d	0

and, poverty effects are ambiguous. If traditional sector employment decreases, Lorenz Curves cross, total income increases and poverty effects are ambiguous.

Proof: See Table 3.2.

We once again see that modern sector growth has the least appealing distributional consequences of the three types of growth patterns. Traditional sector growth is now welfare improving on all counts (with modern sector dualism Lorenz Curves could cross). Modern sector enlargement clearly lead to increased inequality in this type of economy. These results should certainly make the analysis below, in which the effects on income and its distribution induced by government policy are studied, of great interest. We now turn to this analysis.

4. Labour Incomes, Distribution and Development Policy

In this section we analyse the consequences of government policy which raises productivity in one or the other sector of the economy. We analyse the Traditional Sector and Modern Sector Dualism models separately.

a. Modern Sector Dualism

For convenience, we reproduce the model of section 2 below. The model is given by the following equations:

$$L_M + L_T + L_U = 1 \quad 2.2$$

$$DW_T = W_M L_M + W_T L_T + W_U L_U; W_M/W_T \geq D > \text{MIN}(L_T, W_U/W_T); \quad 2.5$$

$$D = D(W_M, W_U, L_M, L_U); D_1 < 0; D_2 < 0; D_3 < 0; D_4 > 0; \quad 2.7$$

$$W_M = W_M(L_M, V_M); W_{M1} < 0; W_{M2} > 0; \quad 2.8$$

$$W_T = W_T(L_T, V_T); W_{T1} < 0; W_{T2} > 0; \quad 2.9$$

$$W_U = W_U(L_U, L_M W_M, V_U), W_{U1} < 0; W_{U2} > 0; W_{U3}' > 0; \quad 2.10$$

$$W_M = \overline{W}_M. \quad 2.11$$

With modern sector dualism, the modern sector wage rate is fixed. We wish to study the effects of increases in each of the policy variables on endogenous variables and income distribution. To do this we first develop a graphical device with which the analysis can be undertaken.

(i) A graphical tool for modern sector dualism

Consider first equation 2.9. In the absence of policy changes, 2.9, traces out a negatively sloped locus in (W_T, L_T) space. This is shown by the curve VT in Figure 4.1. The VT and VM loci together determine the equilibrium configuration of traditional sector wages and employment. To show that VM has a positive slope, first note that, in the absence of any change in V_M , 2.11 and 2.8 together imply fixed modern sector employment. Thus an increase in L_T must imply an equal decrease in L_U in view of 2.2. But lower L_U and fixed $W_M L_M$ imply higher W_U from 2.10. In turn 2.7 implies a lower D in this case. Thus the left hand side of 2.5 must fall if W_T is unchanged. At the same time, the equal but opposite change in L_T, L_U cause the right hand side of 2.5 to increase (since W_T exceeds W_U) as does the increase in W_U . Therefore, to restore the equality of 2.5, W_T must increase.⁹

(ii) Traditional Sector productivity increases. An increase in V_T cause the VT locus to shift out to VT' in view of 2.9 (i.e at each L_T , a higher W_T is now required). Since modern sector wages and employment are unchanged in view of 2.8, the increase in traditional sector employment leads to lower urban unemployment and higher informal sector wages.

9 We have
$$\frac{dW_T}{dL_T} = \frac{W_T D_2 + (W_T - W_U) + (L_U - W_T D_4) W_U}{L_T - D} > 0$$
 for this locus.

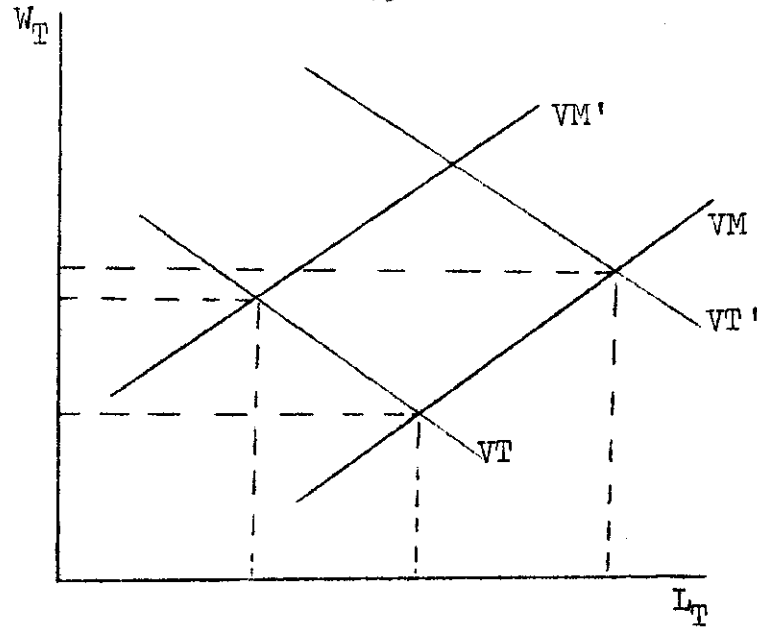


Figure 4.1. Government Policy in the Modern Sector Dualism Model.

This leads to a lower migration premium as would be expected. However, since every worker has either the same or higher wages, total labour income increases. By the same token, poverty decreases. Inequality effects, are however ambiguous. The argument is as follows. Since the modern sector wage bill is constant, the share of modern sector workers in the total wage bill decreases. Therefore, the slope of the third segment of the Lorenz Curve (from the left) is less. However, since both the informal sector wage bill and total labour income increase, the per worker share of informal sector workers in the total wage bill may decrease if the informal sector wage is sufficiently unresponsive to employment changes. In such an eventuality, the slope of the first segment of the Lorenz Curve will also decrease forcing Lorenz Curves to cross. However, the new Lorenz Curve cannot be below the old Lorenz Curve since the share of modern sector workers

decreases. We may therefore state the following proposition.

Proposition 4.1 (Modern Sector Dualism) Increased labour productivity in the traditional sector leads to higher absolute income, less poverty and either declining inequality or crossing Lorenz Curves. Informal sector wages increase and informal sector employment decreases.

(iii) Modern Sector productivity increases. With an increase in V_M , the VM locus shifts to VM' so that traditional sector wages rise and traditional sector employment decreases.

This may be seen as follows. Consider any L_T , say L_T^* . Since V_M has increased and W_M is fixed, L_M must increase in view of 2.8. At fixed L_T , we therefore have falling L_U .

But then, falling L_U and rising $W_M L_M$ imply rising W_U from 2.10 and, therefore a lower premium from 2.7. As before, to restore the equality in 2.5, W_T must increase, so that VM shifts to the northwest. Now, since 2.8 implies rising L_M and since from Figure 4.1 we have a fall in L_T , we see that the effect on L_U is indeterminate. If L_U decreases or remains unchanged, W_U must increase (since $W_M L_M$ has increased) and the differential must decrease. In this case, poverty decreases and since every worker gets at least as high wages as before, total income must increase.

Turning to inequality, we have the following elasticities of the slopes of the three segments of the Lorenz Curve: $w_U - (d + w_T)$, $-d$ and $-(d + w_T)$. Since $(d + w_T)$, the elasticity of total labour incomes, is positive, the third segment of the Lorenz Curve must have a flatter slope. Thus Lorenz Curves will either cross or inequality will decrease.

10. The reader is reminded that we are neglecting derivatives equal to zero. The interested reader is invited to verify that with zero derivatives our conclusions are unaltered or strengthened.

If, L_U increases the results are no longer clear cut. However, the increase in L_M ensures decreasing poverty by the head count measure. Further, the new Lorenz Curve cannot lie below the old curve unless total incomes decrease and informal sector wages decreases by a greater percentage than total income.¹¹ We may therefore state:

Proposition 4.2 (Modern Sector Dualism)

- (i) The impact of modern sector productivity increases on labour incomes and the informal sector is indeterminate except that the number of poor persons must decline.
- (ii) If the informal sector work force does not increase, effects are similar to Proposition 4.1.
- (iii) Necessary conditions for worsening inequality are rising informal sector employment, falling total labour income and a fall in modern sector wages by a greater percentage than the fall in total labour income.
- (iv) Informal sector productivity increases. A process of reasoning similar to that employed before will convince the reader that VM must once again shift northwest to a locus like VM'. (That is, at any given L_T , a higher W_T must result). However, in this case, the constancy of L_M implied by 2.8 ensures that L_U increases, and increases solely on account of new traditional sector migrants. Differentiation of equation 2.5 holding W_U constant gives us

$W_T dD + (D - L_T) dW_T > (W_T - W_U) dL_T$ after some rearrangement where use has been made of the equality of dL_T and $-dL_U$. Now, if W_U is constant, then dD is positive since L_U has increased. Thus, the only way to

11. We have $-w_T - d < -d$ since $w_T > 0$. If the Lorenz Curve is to lie below the initial Lorenz Curve we require $-w_T - d > 0$ and $-w_U - w_T - d < 0 < -w_T - d$.

restore the equality is for W_U increase. Thus, both wages and employment in the informal sector must increase as **must** traditional sector wages.

However, as would be expected, the effect on total income is ambiguous.

An examination of the Lorenz Curve not only convinces us that inequality by the Lorenz Criterion cannot increase.¹² We may therefore state the following proposition

Proposition 4.3(Modern Sector Dualism) With productivity increases in the informal sector, the informal sector is enriched and expands at the expense of the traditional sector which is also enriched. Inequality is either reduced or Lorenz Curves cross. Poverty and aggregate income effects are uncertain (except that poverty is unchanged by the head count measure).

With modern sector dualism, we therefore see that policies which promote the traditional sector have the most desirable distributional consequences while modern sector enrichment has the least desirable consequences by most acceptable welfare criteria.

(b) Traditional Sector Dualism

The model of Traditional Sector Dualism consists of the following equations if we equate supply and demand for informal sector labour.

¹² Since $w_T, w_U > 0$ we have $w_U - w_T - d > -w_T - d$ and $-d > -w_T - d$. Thus if $-w_T - d \geq 0$, all three segments of the Lorenz Curve must have greater slopes so that Lorenz Curves cross. Conversely if $-w_T - d < 0$, inequality will decrease or Lorenz Curves will cross.

$$L_M + L_T + L_U = 1; \quad 2.2$$

$$DW_T = W_M L_M + W_T L_T + W_U L_U; \quad W_M/W_T \geq D \geq 1; \quad 2.5$$

$$D = D(L_T), \quad D_1 < 0; \quad 2.12$$

$$W_M = W_M(L_M, M); \quad W_{M1} < 0, \quad W_{M2} > 0; \quad 2.8$$

$$W_T = W_T(V_T); \quad W_{T1} > 0; \quad 2.13$$

$$W_U = W_U(L_U, W_M L_M, V_U) \quad W_{U1} < 0, \quad W_{U2} > 0, \quad W_{U3} > 0; \quad 2.16$$

$$L_U = L_U(W_U) \quad L_{U1} > 0. \quad 2.15$$

We once again develop a graphical device which will facilitate analysis.

(ii) A graphical tool for the traditional sector dualism model.

We develop our graphical device in (W_M, L_M) space. Equation 2.8 generates the negative VM locus of figure 4.2. However, the, VT locus is not that easily derived. Differentiation of 2.2, 2.5, 2.12, 2.16 and 2.15 logarithmically, holding V_U and V_T constant gives us

$$L_M l_M + L_T l_T + L_U l_U = 0; \quad 4.1$$

$$d = S_M (w_M + l_M) + S_T l_T + S_U (w_U + l_U); \quad 4.2$$

$$d = -\alpha_T l_T; \quad 4.3$$

$$w_U = -\alpha_U l_U + \alpha_M w_M + \alpha_M l_M; \quad 4.4$$

$$l_U = \pi_U w_U; \quad 4.5$$

where $S_i = W_i L_i / DW_T$, $i = M, T, U$, $\alpha_U = |\partial W_U / \partial L_U| L_U / W_U$.

$$\alpha_T = |\partial D / \partial L_T| L_T / D \text{ and } \alpha_M = (\partial W_U / \partial (L_M W_M)) L_M W_M / W_U;$$

and $\pi_U = (\partial L_U / \partial W_U) W_U / L_U$;

Solving the system for w_M / l_M we get

$$w_M / l_M = (a - b - c) / (b - a) = -c / (b - a) - 1; \quad 4.6$$

where $a = L_T(S_M(1+\alpha_U\pi_U) + S_U(1+\pi_U)\alpha_M) > 0$;

$b = (\alpha_T + S_T)L_U\pi_U\alpha_M > 0$;

and $c = (\alpha_T + S_T)(1 + \alpha_U\pi_U)L_M > 0$.

The slope of the VT locus is, therefore, indeterminate. However the slope has the following remarkable pair of properties:

(i) If $S_T \rightarrow 1$ (the modern sector is relatively small) then $a \rightarrow 0$ so that VT becomes negatively sloped.

(ii) If $(S_T + \alpha_T) \rightarrow 0$ (The traditional sector is now vestigial so that only 'die-hard' traditionalists now remain in the traditional sector), $b \rightarrow 0$ and $c \rightarrow 0$ and VT is once again negatively sloped!

Only in the middle stages of development- the stages of interest-can the VT locus be positive.

We consider all three possible cases of w_M/l_M having a positive zero or negative slope. However we rule out the possibility of VT being steeper than VM.

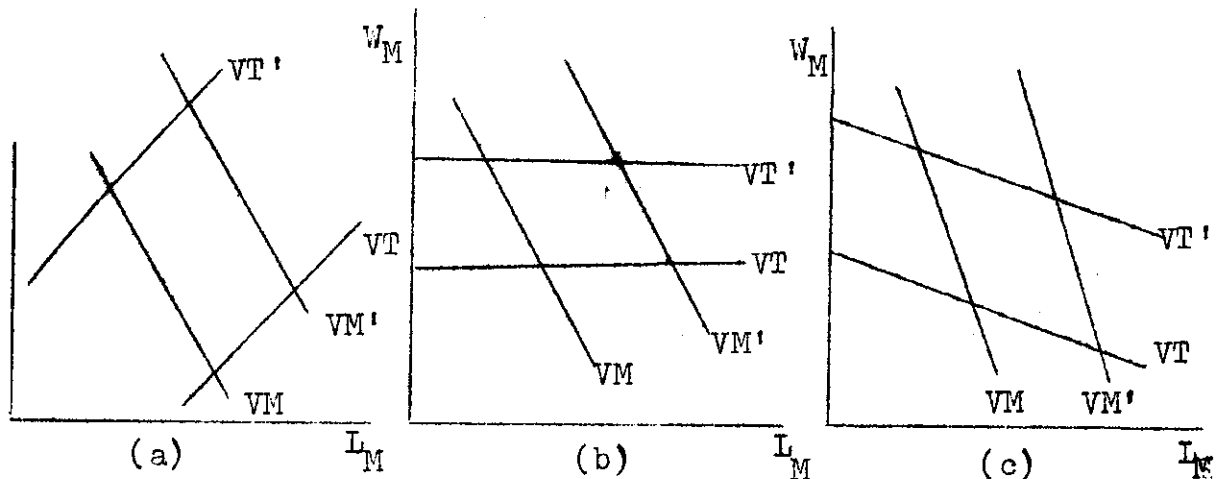


Figure 4.2. Traditional Sector Dualism: Three possible Equilibrium Configurations.

(i) Increases in Traditional Sector Productivity. An increase in traditional sector productivity raises traditional wages. For a given L_M , since the informal sector equilibrium can only be disturbed through changes in the modern sector wage bill, the disturbance in traditional sector wages must have its initial impact on the modern sector wage rate through 2.5'. Thus we see that a higher modern sector wage is required so that VT shifts to VT'. In figure 4.2 this leads to falling employment but rising wages in the modern sector. Of the three cases, the wage bill is most likely to decrease in the case of negatively sloped VT and most likely to increase in the case of positively sloped VT. In the former case wages and employment in the informal sector decline but traditional sector employment increases. Total incomes may rise or fall. In the latter case, wages and employment in the informal sector increase on account of the increased demand for informal sector services. Traditional sector employment effects are uncertain as is the effect on total income.

What is clear is that poverty must increase by the head count measure and modern sector employment must fall. Inequality effects are never clear cut.

Proposition 4.4(Traditional Sector Dualism) Increased productivity in the traditional sector raise wages in the traditional and modern sector and lead to increased poverty by the head count measure. Other effects are uncertain.

(ii) Productivity increases in the modern sector With an increase in V_M , the VM locus shifts to the northeast, resulting in higher modern sector employment. If (as in panels (a) and (b) and perhaps in (c)) the total modern

sector wage bill rises, as is likely, informal sector employment and wages also rise. Thus absolute income increases and poverty decreases by the head count measure. Traditional sector employment decreases while traditional sector wages are unaffected, inequality effects are uncertain. A necessary condition for inequality to increase, is of course an increase in W_M by a greater percent than the increase in W_U .

Proposition 4.5 (Traditional Sector Dualism). Increasing productivity in the modern sector leads to rising modern sector employment and falling poverty by the head count measure. If this leads to a rising modern sector wage bill informal sector employment and wages increase and total income increases.

A general discussion of informal sector productivity increases is not presented since the only predictions possible are that employment and wages in this sector will rise.

(d) Discussion of results

The marked contrast between the effects of traditional and modern sector investment strategies in the two dualistic models highlights the imperative need for a clearer understanding of the causes of dualism. In particular, if the Lewis-Fei-Ranis-Mazumdar paradigm is the correct one, then modern sector investment strategies and rapid industrialisation policies appear warranted.¹² If however, the Harris-Todaro type of dual economy hypothesis is the correct one, then rapid industrialization may have undesirable side effects on distribution and Schultzian tradition sector investment is indicated. If, as seems

¹² But not, of course, at a pace which causes the wage goods constraint to become binding.

reasonable, the type of dualism is different in different countries and indeed in different regions of different economies (contrast, for example Papola's study of Ahmedabad, India, Joshi and Joshi's study of Bombay and Mazumdar's study of Malaysia) then the correct prescription would depend on the type of dualism present.

A second point concerns the direct effects of policies. Since these are likely to outweigh any indirect effects and since productivity enhancement always leads to rising employment in the sector in which the investment is made, a balanced investment strategy is, as would be expected, a relatively riskless option as far as distributional implications are concerned. Whether this strategy has costs in terms of slower growth or poverty alleviation or not is a subject for further research.

5. Summary

In this paper, a general framework for the analysis of development, development policies and income distribution was proposed and studied. The framework allows for intersectoral migration and an urban informal sector. A strength of the framework is its ability to encompass a wide variety of individual behaviour patterns and institutional peculiarities.

The main results of the study show that policy packages which promote traditional sector enrichment will have the most favourable distributional implications regardless of the particular institutional imperfections which lead to dualism. However, labour productivity enhancing investment need not lead solely to traditional sector enrichment. Thus, such policies may have undesirable side effects if dualism is of the type labelled 'traditional sector dualism'. Modern sector productivity enhancing

policies have unfavourable distributional consequences in the presence of modern sector dualism but not (except in exceptional cases) with traditional sector dualism. While increased productivity in the informal sector always benefits that sector, the impact on other sectors is not clear cut and could possibly be unfavourable.

BIBLIOGRAPHY

- Aziz, Abdul (1984). Urban Poor and Urban Informal Sector, Ashish Publishing House, New Delhi.
- Bairoch, Paul (1973). Urban Unemployment in Developing Countries, International Labour Office, Geneva.
- Bartlett, William (1983). On the Dynamic Instability of Induced Migration Unemployment in a Dual Economy, Journal of Development Economics, 13, pp.85-96.
- Bertrand, Trent and Lyn Squire (1980). The Relevance of the Dual Economy Model: A Case Study of Thailand, Oxford Economics Papers, 38, pp.480-511.
- Bhagwati, J.N. and T.N.Srinivasan (1974). On Reanalysing the Harris-Todaro Model: Policy Rankings in the Case of Sector-Specific Sticky Wages, American Economic Review, 64, pp.502-508.
- Bhatia, K.B. (1979). Rural-Urban Migration and Surplus Labour, Oxford Economic Papers, 31, pp.403-14.
- - - - (1983). Rural-Urban Migration and Surplus Labour: Rejoinder to Stark, Oxford Economic Papers, 35, pp.143-45.
- Blomqvist, A.(1978). Urban job creation and unemployment in L.D.C's: Todaro v.Harris and Todaro, Journal of Development Economics, 5, pp. 3-18.
- Gorden, W.M.and Ronald Findlay. (1974). Urban Unemployment, Intersectoral Capital Mobility and Development Policy, Economica, 42, pp.59-78.
- Connell, J.et.al. (1976). Migration from rural areas: The evidence from village studies, Oxford University Press, Delhi.
- Das, S.P. (1982). Sector-specific minimum wages, economic growth, and some policy implications, Journal of Development Economics, 10, pp. 127-131.
- Das-Gupta, A.(1983). The Effects of Tax-Subsidy Policies on the Personal Distribution of Income in a Mobile Capital Harris-Todaro Model. Working Paper, Central Michigan University.

Das-Gupta, A. (1983). The Effects of Direct Tax cum Transfer Policies on the Personal Distribution of Income. Unpublished Ph.D.Dissertation, Cornell University.

- - - - -and Ira N.Gang (1985). Distribution and Development Effects of Tariff Subsidy Policies in Small, Open Dual Economy. Working Paper No.551, Indian Institute of Management, Ahmedabad.

Fields, Gary S. (1975). Rural-Urban Migration, Urban Unemployment, and Job Search Activities in LDC's, Journal of Development Economics, 2, pp.165-87.

- - - - - (1980). Poverty, Inequality and Development, Oxford University Press, London.

Gang, Ira N. (1983). A Tariff, Tariff Revenue and Poverty in a Harris-Todaro Type Economy with Income-Sharing. Pitzer College and Claremont Graduate School, Claremont, Unpublished Manuscript.

- - - - -and Shubhashis Gangopadhyay (1983). A Note on Optimal Policies in Dual Economies, Claremont Graduate School, Quarterly Journal of Economics, forthcoming.

- - - - - and - - - - - (1983). Unemployment with or without Surplus Labor. Unpublished Manuscript.

- - - - - and - - - - - (1984). Optimal Policies in a Dual Economy with Open Unemployment and Surplus Labour. Unpublished Manuscript.

- - - - - and - - - - - (1984). The Choice of Technology and Transfers in a Model with Migration, Mimeo, Indian Statistical Institute, New Delhi.

- - - - - and - - - - - (1984). Welfare Aspects of a Harris-Todaro Economy with Underemployment and Variable Prices. Unpublished Manuscript.

Harris, J.R. and M.P.Todaro (1970) Migration, Unemployment and Development: A Two-Sector Analysis, American Economic Review, 60, pp.126-42.

Heady, C.J. (1981). Shadow Wages and Induced Migration. Oxford Economic Papers, 39, pp.108-121.

House, W.J. and H.Rempel (1978). Labour Market pressures and wage determination in less developed economies. Economic Development and Cultural Change.

International Labour Office (1972). Employment, Incomes and Equality, A Strategy for Increasing Productive Employment in Kenya, International Labour Organization, Geneva.

Joshi, Vijay and Heather Joshi (1976) Surplus Labour and the City. A Study of Bombay. Oxford University Press, Delhi.

Khan, M.A. (1980). The Harris-Todaro Hypothesis and the Heckscher-Ohlin-Samuelson Trade Model. Journal of International Economics, 10, pp.527-47.

- - - - and S.N.H.Naqvi (1983). Capital Markets and Urban Unemployment, Journal of International Economics, 15, pp.367-385.

Lewis, A (1954). Development with Unlimited Supplies of Labour The Manchester School.

Mazumdar, D.(1976). The Rural Urban Wage Gap, Migration and the Shadow Wage, Oxford Economic Papers, 28.

- - - - (1979). Paradigms in the Study of Urban Labour Markets in LDCs, World Bank Staff Working Paper No.366, Washington. D.C.

- - - - (1981). The Urban Labour Market and Income Distribution Oxford University Press, New York.

McCool, Thomas (1982). Wage Subsidies and Distortionary Taxes in a Mobile Capital Harris-Todaro Model. Economica, 49, pp.69-79.

Neary, J.P. (1981). On the Harris-Todaro Model with Inter-sectoral Capital Mobility, Economica, 48, pp.219-34.

Oberai, A.S.(1978). Migration, Unemployment and the Urban Labour Market, International Labour Review, International Labour Organization, Geneva, 115, pp.2.

Stark, O. (1982). Rural-Urban Migration and Surplus Labour: Reservations on Bhatia, Oxford Economic Papers, 34, pp.569-73

Stiglitz, J. (1974). Wage Determination and Unemployment in LDCs, Quarterly Journal of Economics, pp.194-227.

Todaro, M.P. (1969). A model of labour migration and urban unemployment in less developed countries. American Economic Review, 59.

- - - - (1976). Internal migration in developing countries, International Labour Organization, Geneva.

Wellisz, S.(1968). Dual Economies, Disguised Unemployment and Unlimited Supply of Labor, Economics, 35, pp.22-51.

Yap, L.(1977). The attraction of cities: A review of the migration literature. Journal of Development Economics, 4.

Zarembka, P. (1972). Toward a Theory of Economic Development, San Francisco: Holden-Day.