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RURAL–URBAN MIGRATION IN ECONOMIC DEVELOPMENT

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Abstract. This paper provides a review of the theoretical literature on rural–urban migration in contemporary LDCs. The paper begins with a brief discussion of the Lewis model before going on to discuss the Todaro and the Harris–Todaro models and the large literature which these models have spawned. The question of job search in the context of migration and the role of family members in migration decisions are considered next. The paper then takes a closer look at the Informal sector and also sets out alternative migration functions to the ones usually employed in the literature. The paper concludes with a brief note on some of the important implications arising from our study.

Keywords. LDC; Rural–urban migration.

1. Introduction

A large body of literature has grown up in recent years around the topic of rural–urban migration in contemporary less developed countries (LDCs). Given the importance and diversity of research in the area, there is an obvious need for a fairly wide-ranging review of this literature. Yap (1977) and Williamson (1988) have surveyed some of the empirical work in this area; no comparable survey of the theoretical literature, however, exists and the present review will, therefore, focus almost exclusively on the theoretical literature. We begin, however, by briefly outlining the background against which this literature developed and also setting out the organizing framework of the paper.

As is to be expected, the experience of the currently developed countries in their process of development played its part in shaping early development economists' perception of the role of rural–urban migration in economic development. In most of pre-industrial Europe those living in towns were a small proportion of total population, and though there was a constant movement from the country to the towns, rural–urban migration was only a palliative for rural population pressure, not a cure. But in the nineteenth century, the population of the towns began to grow rapidly, and more rapidly than that of the countryside, so that the rural population as a proportion of the total population steadily declined. This remarkable change is generally attributed to industrialization; economic historians are also agreed that a considerable part of this urban growth was due to rural–urban migration.[1] The towns offered new forms of employment opportunities and it was mainly the landless and the rural artisan, undercut by factory goods, who left, and not the farmers. Two of the characteristics of nineteenth-century industry are worthy of note: first, it was still

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labour-intensive, and second, it expanded greatly the range of possible jobs. The Registrar-General recognized some 7000 different occupations in Britain in 1815, 15000 in 1901.[2] Thus while there was cyclical unemployment in the nineteenth-century cities and while there was undoubtedly a great deal of poverty, in the long run industrial growth created enough jobs to be able to absorb the rural surplus of the early nineteenth century and eventually led to a long-term decline in the primary rural populations of Western Europe.

When in the early 1950s economists and others turned their attention to the problems of population growth and economic development in the countries of the Third World, it was thus natural to think that policies which emphasized industrialization would not only increase national incomes, but also relieve the overpopulation of the countryside. However, during the 1960s this view came to be increasingly challenged when it became apparent that inequality and poverty had persisted despite respectable growth in GNP. This challenge has now led to a new orthodoxy in which rural–urban migration in the LDCs is viewed as 'a symptom of and a contributing factor to underdevelopment'.

The current orthodoxy is due mainly to Todaro (1969) and Harris–Todaro (1970). The distinguishing feature of these models is that migration proceeds in response to expected rather than current income differential. Migration is a disequilibrium phenomenon and workers migrate between sectors until expected incomes are equal, at which point equilibrium is established. The expected income in the urban area is the fixed wage in the urban modern sector times the probability of obtaining modern sector employment. The probability of obtaining modern sector employment is defined as the number of modern sector vacancies divided by the number of job seekers in the urban area. And since expected urban income is defined in terms of both wage and employment probability, in these models it is possible to have continued migration in spite of the existence of sizeable rates of urban unemployment. Now assuming potential migrants indeed respond to this urban employment probability, the model of Harris and Todaro (HT) then demonstrates that, in certain parametric ranges, urban job creation may actually result in higher levels of urban unemployment and even reduced national product. This result has had considerable influence on policy formulation in LDC's by emphasizing that in the urban sector, the social opportunity cost of labour nay not be insignificant despite 'burgeoning unemployment'.

However, these models, we shall argue in Section 9 below, do appear to downgrade the role and importance of a free entry urban traditional or Informal sector both in migration process and in contributing to national output, and once a dynamic and productive Informal sector is introduced into the analysis, the unemployment consequences of rural–urban migration on which so much attention has been devoted in the theoretical literature would appear to be greatly exaggerated. Also when careful consideration is given both to the question of job search in the context of migration and the role of family members in migration decisions, the almost exclusive reliance on probabilistic migration functions in the literature will be seen to have been rather unfortunate in that this detracted

attention from the not inconsiderable beneficial aspects of such migration. Indeed, in the concluding note to this review, we shall point to a number of reasons for viewing rural–urban migration favourably in today's LDCs as well.

The organizing framework of the paper is as follows. Section 2 below presents a brief overview of the Lewis model which provided the intellectual stimulus as well as the backdrop against which much of the discussion proceeded in this area for a long time and which argued that laissez-faire solution allocates too much labour to the rural sector compared to the output-maximizing solution — or, in other words, there is too little rural–urban migration if one starts with an entirely rural population. Section 3 then sets out the Todaro model which, in contrast, argues that there is too much rural–urban migration. Todaro formulated his model in terms of expected *income*; a number of subsequent contributions worked in terms of expected *utility* and this section also briefly discusses these contributions. Section 4 then sets out the Harris–Todaro (HT) model and discusses the various extensions and generalizations of the basic model. The model is a two-sector internal trade model with unemployment and rural–urban migration is governed by the probabilistic migration mechanism. The ultimate cause of urban unemployment in the model is an 'institutionally' determined urban minimum real wage. The system is seen to be inefficient and a number of papers have addressed themselves to the question of packaging of policy prescriptions to improve efficiency. Among the issues considered is whether physical control on migration is required for efficiency. Section 4 also reviews a number of papers which extend and generalize the basic model in a number of different directions, e.g., extension of the model to a labour surplus economy, and allowing for capital mobility between the sectors in response to any differences in the return on capital. A further set of papers has considered the dynamic behaviour of the HT model, in particular the question of stability and a review of this literature is also provided in this section.

Sections 5 and 6 then take up two other issues which have generated considerable discussion in the literature associated with the Todaro and the Harris–Todaro models. The first is to specify the precise conditions under which an improvement in employment opportunities in the urban sector would cause the level and the rate of urban unemployment to rise through the resultant initial increase in the probability of finding employment and thus in-migration. Section 6 reviews the relevant literature. Another concern of the literature has been to the effect that the HT model predicts too high an unemployment rate compared to observed rate, and accordingly additional features have been incorporated in the basic model with a view to generating lower predictions for the equilibrium unemployment rate. Section 5 provides a review of this literature. In some of the relevant contributions, a free entry urban Informal sector has been introduced into the analysis with a view to generating lower predictions for the equilibrium unemployment rate; however, the treatment of this sector in much of the theoretical literature would appear to be rather inadequate and this question is taken up later in Section 9.

The question of job search in the context of migration is addressed in Section 7

and one of the important insights of the relevant literature is seen to be the prediction that it is 'contracted' rather than 'speculative' migration (i.e., migration undertaken after having already secured a suitable opportunity at the point of destination rather than migration undertaken in the hope of finding a suitable opportunity at the point of destination) which is likely to be the prevalent form of movement for large sections of the population. This of course conflicts with the underlying premise of the probabilistic migration models. Section 8 considers the role of family members in migration decisions and points to a number of tangible and intangible benefits associated with migration in the context of family. Finally, Section 9 takes a closer look at the Informal sector and also sets out alternative migration functions to the ones usually employed in the literature — functions which explain the available empirical evidence convincingly and have policy implications very different from those of the Harris–Todaro type models. The migration functions presented in this section are seen to be in accord with some of the major implications of the job search literature surveyed in Section 7 and also allow the role of family members in migration decisions to be articulated. The paper concludes with a brief note on some of the important implications arising from our study.

2. An overview of the Lewis model

Rural–urban migration in much of the current economic development literature is viewed as a problem. This was, of course, not always the case, and only a few years ago, such migration was viewed favourably. The celebrated model of Lewis [(1954); later formalized and extended by Ranis and Fei (1961)] provided the intellectual stimulus as well as the backdrop against which much of the discussion proceeded in this area for a long time. The essentials of this discussion can be illustrated within a two-sector general equilibrium framework.[3] The two sectors — labelled agriculture and manufacturing — are assumed to be located in rural and urban areas respectively, so that reallocation of labourers between sectors requires migration.

It will be recalled that the factor–price equalization theorem states that the free movement of commodities is sufficient to bring about equality of absolute real factor prices in both regions under certain assumptions. However, as is well known, these assumptions are extremely restrictive; for instance, incomplete specialization of production is generally necessary for full factor price equality, 'so that trade in agricultural and manufactured goods alone, between urban and rural sectors, will not serve to establish equal real wages for labour in both regions'.

Nevertheless, such factor price equality may be necessary for technical efficiency. Suppose that output for the two sectors is given by the production functions:

$$X_i = X_i(K_i, N_i) \qquad i = a, m \tag{1}$$

where

X_i = output of sector i,

K_i = amount of capital employed in sector i,

N_i = amount of labour employed in sector i

and subscripts a and m stand for agricultural and manufacturing, respectively. The value of total output is given $P.X_a + X_m$, where P is the commodity terms of trade. A necessary condition for the maximization of $P.X_a + X_m$, subject to full employment of both factors, and a given P is:[4]

$$P\left(\frac{\partial X_a}{\partial N_a}\right) = \left(\frac{\partial X_m}{\partial N_m}\right). \tag{2}$$

If the factors of production are paid the value of their marginal product, then (2) is satisfied when:

$$P\left(\frac{\partial X_a}{\partial N_a}\right) = w_a = w_m = \left(\frac{\partial X_m}{\partial N_m}\right). \tag{3}$$

Given that commodity trade alone does not complete the central equality in (3), the issue is whether migration will do so. If the workers migrate from low-wage to high-wage areas and continue to migrate until no wage-differential remains, that is,

$$\dot{N}_u \gtreqless 0 \qquad \text{as} \qquad w_m \gtreqless w_a, \tag{4}$$

then it follows, from an assumption of diminishing marginal productivity of labour, that migration will, indeed, lead to an equilibrium in which labour is used efficiently and serves to promote an equal distribution of wages between urban and rural areas. The situation is depicted in Figure 1,[5] with a stable equilibrium of labour at point a.

A crucial assumption of the above discussion is that the workers in the rural sector are paid the value of their marginal product. This assumption, however, has been widely questioned in the context of LDCs. Lewis (1954), for example, has argued that in many LDCs so many workers are crowded onto so little land that workers may be withdrawn from agriculture without reducing agricultural output. In terms of Figure 1, the economy is operating supposedly in equilibrium, somewhere to the right of b, in the range where $\partial X_a/\partial N_a = 0$. Despite the migration rule (4), rural–urban migration cannot move the system towards point a, because, according to Lewis, $w_m = w_a$ at some level, w', above w^*. The output of family farms in the rural sector, it is argued, is simply divided amongst the family members,[6] and $w' = P \cdot X_a/N_a$, as shown in Figure 1, and:

$$P \cdot \left(\frac{\partial X_a}{\partial N_a}\right) < P \cdot \left(\frac{X_a}{N_a}\right) = w_a = w_m = \left(\frac{\partial X_m}{\partial N_m}\right). \tag{5}$$

It is obvious that the laissez-faire solution here allocates too much labour to the rural sector compared to the output-maximizing solution — or, in other

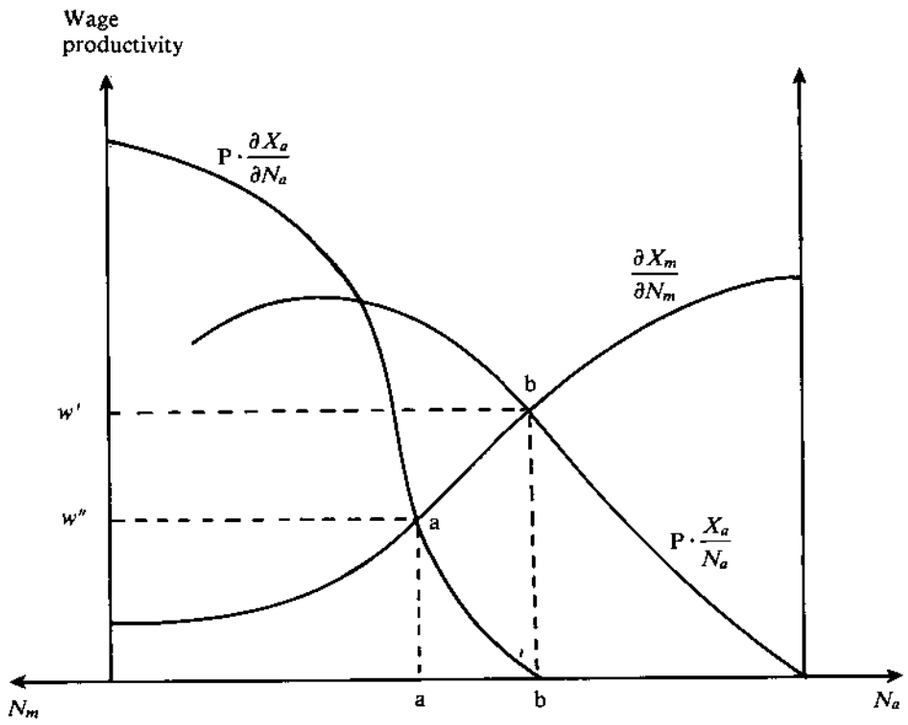

Figure 1.

words, there is too little rural–urban migration if one starts with an entirely rural population. It will be noticed that it is superfluous to this argument that $\partial X_a/\partial N_a = 0$. So long as $P \cdot \partial X_a/\partial N_a < \partial X_m/\partial N_m$, the same conclusion follows.

3. Probabilistic migration models

As against the above view which suggests that there is too little rural–urban migration, there is the current orthodoxy which argues that there is too much rural–urban migration. This current orthodoxy is due primarily to Todaro (1969), and Harris–Todaro (1970). We shall first review the basic Todaro model. In this basic model, an individual's decision to migrate from the rural to the urban area depends on two principal variables: the real income differences between the urban and the rural areas, and the probability of obtaining an urban job. His expected income as an urban dweller is given by

$$V_u(0) = \int_{t=0}^{n} p(t)\, Y_u(t) e^{-rt}\, dt - C(0)$$

where

$Y_u(t)$ = net urban real income in period t,

$p(t)$ = the probability of having a modern sector job in period t,

$C(0)$ = the initial fixed cost of migration and relocation in the urban area,

n = planning horizon, and

r = (subjective) rate of time preference used for discounting the present value of the future income stream.

The typical migrant is viewed as arriving in the urban area and joining a large pool of unemployed and underemployed workers in the urban traditional sector. 'The selection from this pool in each period is assumed to be random with the probability of selection being equal to the ratio of new job openings relative to the number of workers in the urban traditional sector'. Since the probability of having a job in any period, $p(t)$, is directly related to the probability of having been *selected* from the pool of urban traditional workers in that or any previous period, one can formulate the relationship between these two variables in the following way. 'Let $\pi(t)$ be the probability of being selected from the pool of urban traditional workers during period t if the worker is a member of that pool in period t; and let $p(t)$ be, as before, the probability of *having* a job in the urban modern sector in period t. It follows that

$$p(0) = \pi(0)$$

and that

$$p(1) = \pi(0) + [1 - \pi(0)]\,\pi(1) \ldots .$$

Generalizing, we see that for any period t,

$$p(t) = p(t-1) + [1 - p(t-1)]\,\pi(t)$$

or,

$$p(t) = \pi(0) + \sum_{i=1}^{t} \pi(i) \prod_{j=0}^{i=1} [1 - \pi(j)]$$

where

$$\prod_{i=1}^{n} a_i = a_1,\ a_2,\ a_3,\ a_4,\ \ldots\ a_{n-1},\ a_n.'^{7}$$

Todaro defines the probability of being selected for a job during period t as being equal to the ratio of new modern sector employment openings in period t relative to the number of accumulated job seekers in the urban traditional sector at time t.

Now, a potential migrant will compare the value for $V_u(0)$ with his expected lifetime income if he remains in the rural sector:

$$V_R(0) = \int_{t=0}^{n} Y_R(t) e^{-rt}\, dt$$

where

$Y_R(t)$ = 'net expected rural real income in period t based, say, on the average real income of x previous periods'.

If $V_u(0) > V_R(0)$, the rural worker, or more accurately, a portion of all rural workers, will migrate; specifically, the rate of in-migration to urban areas is a function F of the ratio of the expected difference in incomes to the rural income, thus providing for a subjective 'cut-off' percentage of excess urban over rural expected income which rural workers would require to migrate. In this model, it is therefore possible to have continued migration in spite of the existence of sizeable rates of urban unemployment.

Todaro formulated his model in terms of expected income rather than in terms of expected utility. Stiglitz (1969) was the first to use an utility approach. In his model, all individuals are assumed to have identical utility functions:

$$U(Y, L), \qquad \frac{\partial U}{\partial Y} > 0, \qquad \frac{\partial U}{\partial L} < 0$$

where

Y = income

L = labour-effort supplied.

The income of a worker in the agricultural sector equals his wage (i.e., $Y_a = w_a$), and he equates the return from supplying an extra unit of work, $\hat{w}_a$, to the marginal rate of substitution between income and leisure:

$$\frac{-U_2}{U_1} = \hat{w}_a.$$

Similarly, $-U_2/U_1 = \hat{w}_m^e$ for a worker in the manufacturing sector, where $\hat{w}_m^e$ denotes the return to the worker from supplying an extra unit of work. In equilibrium, denoting solution values by asterisks, the marginal migrant must be indifferent between utility available in the agricultural and in the manufacturing sectors:

$$U(Y_a^*, L_a^*) = U(Y_m^*, L_m^*).$$

Zarembka (1972) also uses a utility formulation in the context of Todaro model. The worker in the rural sector receives an average annual wage of w_a, from which flows a utility of $u(w_a)$; he discounts future utility at the rate λ, so that total future utility at time of migration, t, from remaining in agriculture, is

$$U_a(t) = \int_t^{t+n} e^{-\lambda(t'-t)} u(w_a)\, dt'$$

where n is his planning horizon and t' is $t \neq 0$. Integrating yields

$$U_a(t) = \frac{u(w_a)}{\lambda}(1 - e^{-n\lambda}). \qquad \text{(Eq. 3.1, p. 55)}$$

In the urban sector the expected income of a worker is the urban wage, w_m, times the probability of being employed in the modern sector, $J(t)$, plus earnings from casual labour (Zarembka calls this 'service sector'), w_s, times the probability of being unemployed, $1 - J(t)$. The *utility of expected income* in the urban sector is given by

$$U_u(t) = \int_t^{t+n} J(t') e^{-\lambda(t'-t)} u(w_m)\, dt' + \int_t^{t+n} [1 - J(t')] e^{-\lambda(t'-t)} u(w_s)\, dt'.$$

(Eq. 3.2, p. 56)

Zarembka's formulation for $J(t')$ is derived by 'letting the probability of getting a job at time t', $dJ(t')/dt'$, equal the probability of getting a job if unemployed, $j(t')$ — the density function for the probability of an unemployed worker obtaining a job at time t' — times the probability of being unemployed, i.e., $J'(t') = j(t')[1 - j(t')]$'. Integrating from t to t', with $J(t' = t) = 0$, and rearranging yields

$$J(t') = 1 - e^{-[j(t)](t'-t)}. \qquad \text{(Eq. 3.3, p.58)}$$

Substituting (3.3) into (3.2) yields the utility a potential migrant will obtain from the income he can expect as an urban dweller:

$$U_u(t) = \frac{u(w_m)}{\lambda}(1 - e^{-n\lambda}) - \frac{u(w_m) - u(w_s)}{\lambda + j(t)}(1 - e^{-n[\lambda + j(t)]}).$$

(Eq. 3.4, p. 58)

Choosing a unit of measurement for utility such that $u(w_s) = 0$, and assuming that λ is not large (non-myopic planning horizon), the equilibrium urban-rural wage ratio is given by

$$1 - \frac{1 - e^{-n[\lambda + j(t)]}}{n[\lambda + j(t)]} = \frac{u(w_a)}{u(w_m)} \qquad \text{(Eq. 3.5, p. 59)}$$

and it follows that a higher urban wage implies a lower probability of modern sector employment.

Bhatia, in a recent paper (1979), adopts yet another approach. In Bhatia's specification, workers migrate to equalize *expected welfare* (rather than *expected incomes*) which depends on income as well as other variables. An individual who derives utility from income and suffers disutility from effort will migrate to the urban area if

$$p[(U(W_M H_M + Y) - V(H_M)] + (1 - p)[U(Y) - V(0)] > U(W_A H_A + Y) - V(H_A) \quad \text{(Eq. 1, p. 404)}$$

where

p = the perceived probability of finding a job in urban area,

U = utility from income,

V = disutility from effort,

W_M = wage rate in the urban area,

W_A = wage rate in the rural area,

H_M = work hours in the urban sector,

H_A = work hours in the rural area, and

Y = non-wage income.

If a migrant finds a job in the urban area, the change in his utility can be defined as:

$$\Delta U_M = U(W_M H_M + Y) - U(W_A H_A + Y).$$

If, however, he fails to obtain a job in the urban area, and has to remain unemployed, then the change in his utility can be defined as

$$\Delta U_A = U(W_A H_A + Y) - U(Y).$$

In equilibrium, the two sides of (Equation 1) will be equal, so we can rewrite (Equation 1) as

$$p\left(\frac{\Delta U_M}{W_M H_M - W_A H_A}\right)(W_M H_M - W_A H_A) - (1-p)\,\frac{\Delta U_A}{W_A H_A}\,W_A H_A = pV(H_M) + (1-p)V(0) - V(H_A). \quad (2)$$

Furthermore, if we assume that marginal utility of income is constant (so that $\Delta U_M/(W_M H_M - W_A H_A) = \Delta U_A/W_A H_A$), and that $V(0) = 0$, equation (2) can be written as

$$W_A H_A - \frac{V(H_A)}{\alpha} = p\left\{W_M H_M - \frac{V(H_M)}{\alpha}\right\} \quad (3)$$

where α is the (constant) marginal utility of income. In equilibrium, expected urban income (net of disutility of work) will be equal to a peasant's income (again net of disutility of work) on the farm. To go from (3) to the Harris–Todaro equilibrium condition, we need the additional assumption that either workers ignore disutility of effort, or they always work for as many hours as would equalize the expected disutility in the two sectors. In such a case (3) will reduce to

$$E = W_A - pW_M H_M = 0 \quad (3a)$$

which is the Harris–Todaro equilibrium condition when p is defined as the urban employment rate, and $W_A H_A$ and $W_M H_M$ are interpreted as the wage rate per worker in the two sectors.

The utility formulation, as is clear, is certainly more versatile than the straight expected income formulation, since such a formulation allows one to incorporate different life-styles and preferences into the analysis. However, the issues that we intend to highlight in this review are not affected in any important way by not using the utility formulation; consequently, in what follows we will prefer the simplicity of the straight income approach.

4. The Harris–Todaro model and its extensions and generalizations

It will be recalled that Todaro adopts essentially stochastic formulation of the urban wage, modifying equation (4) of p. 5 accordingly to

$$\dot{N}_u \gtreqless 0 \quad \text{as} \quad w_u^e \gtreqless w_a \quad (5)$$

where w_u^e is the expected value of the stochastic w_m. Notice that, by relying upon the mean alone, Todaro is assuming that the migrants are risk-neutral. Expected urban wage is given by the wage, w_m, and the employment rate (N_m/N_u, where N_m is labour employed in urban sector and N_u is the total urban labour force) which governs the probability of receiving w_m. Hence

$$w_u^e = E\left(w_m, \frac{N_m}{N_u}\right) \quad \text{with } E_1 > 0 \quad \text{and} \quad E_2 > 0. \quad (6)$$

In considering the efficiency implications of a comparative static model embodying (5) and (6), it is generally assumed that there is productive efficiency within the other (rural) sector now, so that $w_a = P \cdot \partial X_a/\partial N_a$ (or $w_a \cdot 1_a = P \cdot dX_a/dN_a$, if labour is elastically supplied). Thus migration ceases when

$$P \cdot \frac{\partial X_a}{\partial N_m} = E\left(w_m, \frac{N_m}{N_u}\right). \quad (7)$$

Analysis of the relationship of (7) to an efficient solution, together with the packaging of policy prescriptions to improve efficiency, cannot proceed independently of the source of unemployment in this comparative static framework. In the Harris–Todaro (1970) model, the ultimate cause of urban unemployment is an 'institutionally' determined urban minimum real wage, $\bar{w}_m$. The model is a two-sector internal trade model with unemployment. The model consists of 8 equations and 8 unknowns as follows:

(1) Production function for the rural sector is given by

$$X_a = q(n_a, \bar{L}, \bar{K}_a) \qquad q' > 0, \qquad q'' < 0$$

where

X_a = agricultural output

N_a = the rural labour employed in the agricultural sector

$\bar{L}$ = the fixed availability of land

$\bar{K}_a$ = the fixed capital stock

q' is the derivative of q with respect to N_A.

(2) Production function for the manufacturing sector, located in the urban area, is given by

$$X_m = f(N_m, \bar{K}_m), \qquad f' > 0, \qquad f'' < 0$$

where

X_m = the manufacturing output

N_m = the total labour (urban and rural migrant) required to produce this output

$\bar{K}_m$ = the fixed capital stock

f' is the derivative of f with respect to N_M.

(3) Price Determination

$$P = p\left(\frac{X_m}{X_a}\right), \qquad p' > 0$$

where

p = the price of the agricultural good in terms of the manufactured good.

(4) Agricultural Real Wage Determination

$$w_a = P \cdot q'$$

where

w_a = the agricultural real wage.

(5) Manufacturing Real Wage

$$w_m = f' \geqslant \bar{w}_m.$$

However, it is assumed that we are dealing only with cases in which $f' = \bar{w}_m$ (i.e., there is never an excess demand for labour at the minimum wage).

(6) Urban Expected Wage

$$w_u^e = \frac{\bar{w}_m N_m}{N_u}, \qquad \frac{N_m}{N_u} \leqslant 1$$

where

N_u = total urban labour force (permanent urban plus migrants).

(7) Labour Endowment

$$N_a + N_u = \bar{N}_R + \bar{N}_u = \bar{N}.$$

There is a labour constraint which states that the sum of workers actually employed in the agricultural sector (N_a) plus the total urban labour force (N_u) must equal the sum of initial endowments of rural ($\bar{N}_R$) and permanent urban ($\bar{N}_u$) labour which in turn equals the total labour endowment ($\bar{N}$).

(8) Equilibrium Condition

$$w_a = w_u^e.$$

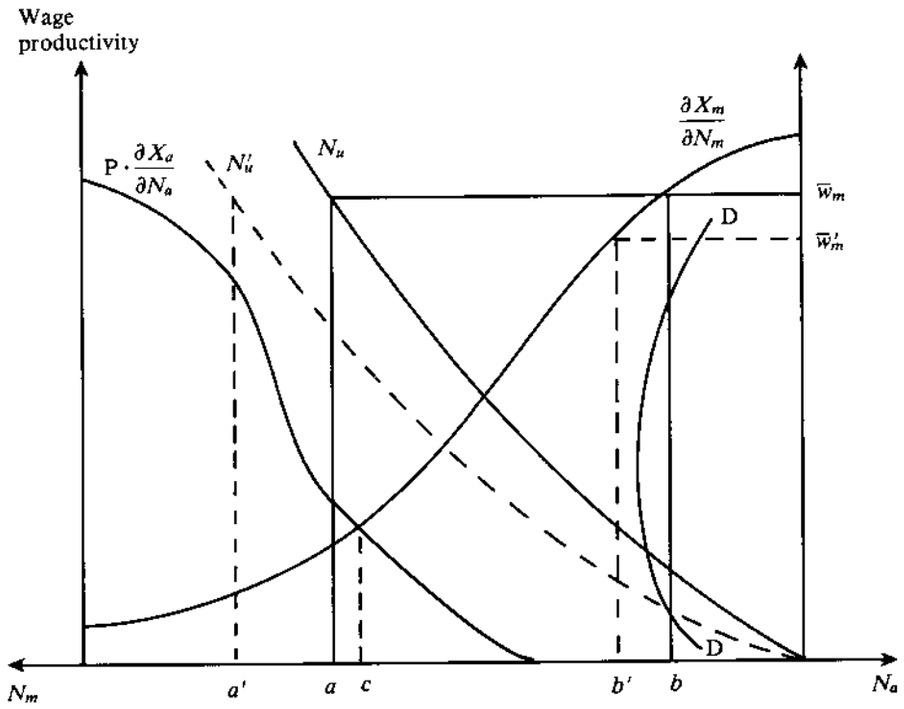

Figure 2.

This equilibrium condition is derived from the hypothesis that migration to the urban area is a positive function of the urban–rural expected wage differential. This can be written formally as

$$\dot{N}_u = \psi\left(\frac{\bar{w}_m N_m}{N_u} - P \cdot q'\right) \qquad \psi' > 0, \qquad \psi(0) = 0$$

where $\dot{N}_u$ is a time derivative. Clearly then, migration will cease only when the expected income differential is zero, the condition posited in (8).

There are thus 8 equations in 8 unknowns, X_a, X_m, N_a, N_m, w_a, w_u^e, N_u and P in the model and, given the production functions and fixed minimum wage $\bar{w}_m$, it is possible to solve for sectoral employment, the equilibrium unemployment rate and, consequently the equilibrium expected wage, relative output levels and terms of trade.

The model is depicted in Figure 2. The competitive manufacturing sector employs labour up to point b, where $\bar{w}_m = \partial X_m / \partial N_m$. The curve N_u is a supply schedule of labourers to the urban sector, and given $\bar{w}_m$, we may now read employment in the urban sector at b, urban unemployment as ab, and employment in the agricultural sector at a. The system is of course inefficient as

labourers are unemployed and $P \cdot \partial X_a/\partial N_a < \partial X_m/\partial N_m$. The source of this inefficiency is, of course, the minimum wage and the first best policy clearly would be to remove this rigidity. However, this may be politically infeasible; a standard second best policy suggestion is a wage subsidy to employers in the urban sector, which will effectively lower their observed wage from $\bar{w}_m$ to $\bar{w}'_m$, and induce them to increase urban employment from b to b' in Figure 2. Should the N_u curve remain fixed, unemployment would fall to ab'. However, $\bar{w}_m$ observed by the workers remain unaltered, so w_u^e would increase for any given w_m, and N_u must, therefore, shift left as shown by N'_u. Indeed, it is possible that $a'b' > ab$, with unemployment magnified; output may also fall despite subtraction of workers from low marginal productivity agriculture and addition of them to higher marginal productivity industry, for the number of workers engaged in the former (aa') then exceeds the latter (bb').

It would thus appear that in the context of Harris–Todaro model a wage subsidy to urban sector alone will not achieve the desired result. Harris and Todaro advocate a policy package of urban wage subsidies coupled with quantitative migration controls. By physical restrictions on migration, rural–urban migration can, in principle, be held constrained at point c in Figure 2, while wage subsidies are simultaneously used to slide $\bar{w}'_m$, down to $\partial X_m/\partial N_m$ to c — the output maximizing position that would be achieved in the absence of the urban minimum wage. However, in a subsequent contribution, Bhagwati and Srinivasan (1974) have pointed out that, in the context of Harris–Todaro model, physical restrictions upon migration is not essential to achieve point c. If $w_a = w_m$, then no free migration occurs and no unemployment results. This latter condition is satisfied at point c when

$$w_a - S_a = P \cdot \frac{\partial X_a}{\partial N_a} = \frac{\partial X_n}{\partial N_m} = \bar{w}_m - S_m$$

where S_i is a wage subsidy to employers in sector i. Using $w_a = \bar{w}_m$, it then follows that $S_m = S_a$. In other words, an equal wage subsidy to both sectors achieve point c.[8] Note, however, that since the solution is a universal subsidy — rather than a tax-cum-subsidy — it raises the problem of financing without producing countervailing distortions,[9] and a number of recent papers have addressed themselves to the question of the source of revenues for employment subsidies in the presence of induced migration; see, among others, Heady (1987, 1988), McCool (1982), Blomqvist (1979), Jha and Lachler (1981).[10] Another problem with the Bhagwati–Srinivasan optimal subsidy (call it, say, s^*) is that a particular component of their subsidy formula is the marginal produce of labour *in the optimal situation*. To suppose that this will be known to the government at the time when the subsidy is given (i.e., prior to attaining the optimum) is an extremely strong informational assumption. However, it can be shown that the Bhagwati–Srinivasan result can be substantially generalized. Basu (1980), for example, has argued that in the Harris–Todaro model there is a whole interval of optimal subsidies, and s^* is only one element in this interval. While s^* generates optimality, so does any other subsidy in this interval. Basu

then shows that the prevailing urban market wage is an element of this interval.[11] Hence, the government can now give a subsidy which ensures optimality, the value of which is easily determined.[12]

In their work, Harris–Todaro very carefully exclude agricultural labour surplus from the analysis.[13] Bhatia (1979) has extended the Harris–Todaro model to a labour surplus economy. He explicitly allows for the possibility that rural output may not decline when outmigration takes place;[14] further, he allows for flexible work-hours in agriculture based on labour–leisure choice by individual workers. Migration equilibrium in his model is characterized by equality of expected welfare rather than expected income in the two sectors, and in this model, 'increase in expected wage still causes outmigration from agriculture, but if the commodity–price ratio is exogenous, outmigration occurs when minimum wage is raised even when expected urban wage is constant'. Migration flows are also larger than in a closed economy with fixed work-hours. Moreover, if society places some value on extra consumption generated by additional employment, then, in this model, the shadow wage rate of labour is likely to be less than the urban minimum wage. Bhatia also shows that the results on optimal subsidies in the Harris–Todaro model derived by Bhagwati–Srinivasan (1974) will not be optimal when work-hours in agriculture are variable and open to workers' choice.

It will be noted that in the HT model, the capital stocks in each sector are given and capital is specific to each sector. Corden and Findlay (1975) examine the consequences of relaxing this assumption. They allow for the mobility of capital between the two sectors in response to any differences in the return on capital. In the HT model, the existence of a minimum wage above the competitive level causes a reduction in the output of the manufacturing sector, since higher wage leads to less employment with a fixed capital stock. But the output of the agricultural sector could be higher or lower.[15] The crucial consideration is what Corden–Findlay call the *manufacturing elasticity*, n_m, and which is defined as the proportional change in labour input in manufacturing divided by the proportional change in marginal product. When $n_m = 1$ over the relevant range, the output in agriculture will stay unchanged as a result of the existence of the minimum wage, when $n_m > 1$, the agricultural output increases as a result of the minimum wage, and when $n_m < 1$ agricultural output falls.

Corden–Findlay, then, go on to show that, in the presence of capital mobility, when $n_m = 1$ manufacturing output falls to 'below the HT level which was already below what it would be in the standard model. Agricultural output, on the other hand, expands in the capital mobility case whereas compared with the standard competitive level, it was unchanged in the HT case'. When $n_m > 1$, introduction of capital mobility 'compounds both the fall in manufacturing output and the rise in agricultural output that would take place in the HT model if a minimum manufacturing wage were established above the competitive equilibrium wage'. When $n_m < 1$, two cases have to be considered. If the marginal product of capital declines more in manufacturing than in agriculture, then output in manfacturing sector will fall to below its HT level and in

agriculture rise above it. Compared with the standard competitive case, the output of agriculture may rise or fall depending on whether the initial loss of labour to the urban sector is offset or not by the inflow of capital and the reverse flow of labour that it brings in its train. If, however, the marginal product of capital declines more in agriculture than in manufacturing, then capital will move out of agriculture into manufacturing. The wage rate in agriculture will fall and the urban unemployment ratio will thus rise. 'By contrast with all the cases so far considered, capital mobility raises manufacturing output and lowers agricultural output in relation to the HT outcome. Bearing in mind that in the HT case the minimum wage causes manufacturing output to fall compared with the standard competitive case, the question then arises whether the net result of capital mobility could be for manufacturing output actually to increase when a minimum wage is imposed, so reversing the sign of the HT effect.' Corden–Findlay show that such an outcome is actually possible, on not too implausible assumptions. A sufficient condition is simply that there are fixed coefficients of production in both sectors with manufacturing being the relatively capital-intensive sector. Again Corden–Findlay show that, in their extension of the Harris–Todaro model, in contrast with the standard model, a wage subsidy to manufacturing necessarily increases the unemployment rate in manufacturing. The effect of a wage subsidy to agriculture, on the other hand, is to leave the output of manufacturing unchanged in the standard model while lowering it in the case of capital mobility.[16,17]

While Corden–Findlay examine the consequences of introducing capital-mobility in the HT framework, Peter Neary (1981) analyses the dynamic behaviour of the HT model in the presence of intersectoral capital mobility. In the absence of capital mobility, the HT model is always stable.[18] In the presence of capital mobility, however, this is no longer the case, and a necessary though not a sufficient condition for stability is the requirement that the manufacturing sector be relatively more capital intensive. Near also examines the paradox noted by Corden–Findlay: that an increase in the minimum wage in manufacturing may increase manufacturing output. A necessary and sufficient condition for this outcome is derived (in an appendix) by Neary from which it may be deduced that the paradox is more likely the lower are the elasticities of substitution in production, and the greater is the difference in factor shares between the two sectors.

Neary's result that manufacturing be relatively more capital intensive for stability was derived by ignoring land as a scarce factor in agricultural production. Funatsu (1988) in a recent note has shown how the stability condition will differ when land is explicitly introduced as a third scarce factor in agriculture and Neary (1988) has subsequently elaborated on some of Funatsu's results. It turns out that when land is explicitly included as a third scarce factor in agriculture 'the stability condition when land is ignored — that the urban sector (comprising manufacturing industry and the urban unemployed) be more capital abundant — is no longer either necessary or sufficient for stability. Nevertheless, this condition always enhances stability and it is sufficient (though

not necessary) for stability in many circumstances (e.g., when land is separable in production from labour and capital)'.[19]

In addition to Neary and Funatsu's contribution just mentioned, four other recent contributions deal with the dynamic aspects of the Harris–Todaro model. Amano (1983) shows that in his model, where migration is governed by the Harris–Todaro mechanism but the urban wage rate, unlike in the Harris–Todaro model, is endogenously determined, the dynamic system has a unique equilibrium (steady state) which contains, depending upon the parameter values of the model, either full employment with equal wage rates between the two sectors, or urban unemployment with a wage differential. Furthermore, the equilibria turns out to be either stable or unstable, again depending upon parameter values. In contrast to Amano who uses the Harris–Todaro (1970) migration mechanism, Bartlett (1983) uses a dynamic version of the Todaro (1969) migration hypothesis[20] and shows that in this model the steady-state growth equilibrium is characterized by a positive unemployment rate and is unstable. Day *et al.* (1987) investigate the question of stability by using some recent developments in nonlinear dynamics. They find that, in their framework, instability is indeed a possibility and that regular or irregular, nonperiodic fluctuations can be propagated — even in the absence of any exogenous shocks. The source of these results is the lag in adjustment on labour markets combined with the non-linearity of the labour supply function. In contrast to these studies, Das's (1982) concern is slightly different. In the context of a growing economy that is characterized by urban unemployment à la Harris–Todaro, he asks how much such an economy should save, and how much should be invested in each sector. His answer is that in the steady state of such an economy, the optimal saving ratio is greater than the golden rule saving ratio under full employment. Also the optimal proportion of total investment allocated to the urban sector is not necessarily higher than the optimal proportion under full employment.[21]

5. Probabilistic migration models and the equilibrium unemployment rate

It will be recalled that, given $w_u^e = \bar{w}_m N_m / N_u$, the rural–urban equilibrium condition in Harris–Todaro formulation, $w_a = w_u^e$, becomes

$$w_a = \bar{w}_m \frac{N_m}{N_u}.$$

The equilibrium employment rate is then given by

$$\frac{N_m}{N_u} = \frac{w_a}{w_m}.$$

It has generally been accepted in the literature that this predicts too high an unemployment rate compared to observed rate, and accordingly additional features have been incorporated in the basic Harris–Todaro model with a view to generate lower predictions for the equilibrium unemployment rate. These

recent models differ from the basic Harris–Todaro model most notably in incorporating an informal sector (see, for example, Harberger (1971), Zarembka (1972), Mazumdar (1975), Fields (1975), Stiglitz (1976), Colliers (1979)). Other extensions of the basic Harris–Todaro model are the recognition of the heterogeneity of migrants (Mazumdar, Stiglitz, Colliers); the labour turnover approach (Stiglitz, Fields, Johnson); recognition of employers preferential treatment of the better educated workers (Stiglitz, Harris and Sabot, Colliers); consideration of the appropriateness of present versus current values in the migration decision-making process (Fields).

It will be recalled that in the HT model, the probability of obtaining an urban job is defined as the number of urban jobs divided by the urban labour force. Now this specification implies that persons living in rural areas have no chance of obtaining urban jobs. However, if we allow for the possibility that even persons living in rural areas have some positive chance of obtaining urban jobs, then as Fields (1975) shows, we get lower equilibrium unemployment rate than that predicted by HT, 'and the greater the relative chance of rural workers finding urban jobs, the greater is the discrepancy between the general result and the HT result'. Fields also shows that the introduction of an informal sector, "which gives each member of the labour force a new option",[22] leads to lower equilibrium rate than the HT result. Similar conclusion follows if urban employers prefer better educated workers.[23] Also recall that in the Harris–Todaro model, the urban employment probability is given by the ratio of urban jobs to the urban labour force. This specification implies that all jobs turn over every period.[24] In this context, Johnson (1971) has shown that the labour turnover rate and the equilibrium unemployment rate vary directly, and since the Harris–Todaro model has the maximum possible turnover rate, it predicts a higher equilibrium unemployment rate than would be expected for any finite rate of labour turnover.

Mazumdar (1975, 1976, 1977), in a series of papers, has analysed the urban labour markets and examined the interaction between the formal and the informal sectors.[25] His model leads to a prediction that 'the level of earnings in the informal sector would be below that in agriculture. Migrants are willing to incur a "loss" during the period of search in the urban market in expectation of getting a high-wage formal sector job later on'. Again, '... as long as participation in the informal sector does not reduce the probability of obtaining a formal sector job to a negligible value ... equilibrium earnings in the sector (i.e., informal sector) will be below the marginal supply price of migrants from agriculture'. Mazumdar's argument can be paraphrased as follows: if there were no modern (formal) sector in the urban area, but only an informal sector where 'the trend in average earnings' was 'determined by the rate of growth of labour supply', then migrants would come to the informal sector till average earnings in that sector fell to the level of the alternative income of migrants in the rural areas. However, the existence of a formal sector means that migrants take into account not only 'average earnings' in the informal sector but also the wage level and the probability of obtaining jobs in the formal sector. Mazumdar is then led

to the conclusion that the rate of increase of 'average earnings' in the informal sector will be lower than that in agriculture.

6. Urban job creation and urban unemployment

One of the predictions of Todaro's 1969 model was that 'the proportional equilibrium size of the urban traditional sector will vary ... inversely with the rate of job creation'. In a comment on this Todaro model, Zarembka (1970) first raised the possibility that 'an improvement in employment opportunities in the urban sector, say through output expansion, will *increase* the unemployment rate through the resultant initial increase in the probability of finding employment and thus in migration'. In his reply, Todaro, however, was sceptical: 'I was not then, and am still not now prepared to go to the extreme, and, I think, empirically incorrect statement that the urban unemployment *rate* will increase whenever the rate of employment creation expands.' By contrast, Mazumdar (1975) found that in his model 'the increase in the growth of urban job creation will increase the urban unemployment rate even further than the increase caused by the lift in the wage ratio'. Todaro himself, in a subsequent paper (1976a; see also 1976b), using basically the same original model, derived conditions for the *level* and the *rate* of urban unemployment to rise following an increase in job opportunities.

Blomqvist (1978) has attempted to resolve the conflict between the conclusions of these different papers by presenting what he calls a synthesis of the Todaro (1969) and Harris–Todaro (1970) models. His model specifies the flow of migration as a partial adjustment mechanism and his principal conclusion, from the point of view of policy recommendations, is an agnostic one: 'because of problems of model specification ... existing empirical results regarding rural–urban migration in LDCs cannot yet be used to judge the validity or otherwise of the Todaro paradox, neither in the short run nor in the long run'.

More recently, Arellano (1981) has examined why different results were obtained by the different papers. He concludes that 'the results depend crucially on the functional form chosen to represent the migration flow and on the period of time allowed for adjustment. Todaro's (1969) conclusion that the unemployment rate would not rise as a result of more jobs being opened in the modern sector refers to the steady state and is warranted by his assumption of a unit elasticity of migration. Assuming a different migration function Blomqvist and Zarembka opened the probability for the unemployment rate to increase in the long run. The different conclusion reached by Todaro (1976) refers to the short-run, and to the case when the elasticity of migration is constrained to be constant but not necessarily equal to one'.

In this connection, mention should also be made of Collier's (1979) contribution. Collier presents and tests an analytic model of the Tanzanian labour market. His results conflict with the Todaro hypothesis that urban job creation will increase the size of the urban informal sector. In his model increase in 'wage employment opportunities' reduces the size of the informal sector 'by

forcing up the marginal supply price of migrants and thus the minimum acceptable income which retains workers in low-income self-employment'.

7. Job search strategy and migration decisions

We have now in the main completed the survey of the Todaro and the Harris–Todaro models and the various extensions and generalizations of these models. In our discussion so far, it will he noted, we have made no explicit reference to underlying search strategy in the decision to migrate. An understanding of such strategy can, of course, be of considerable help in understanding how individuals are likely to structure their decision-making process and may also shed additional light on aggregate migration behaviour. However, while there exists by now a substantial literature on the economics of search behaviour, the specific case of migration in the context of search theory has received relatively little attention in the literature; further, this attention has almost exclusively been in the context of interregional migration in developed countries. Nevertheless, I provide here a brief review of this literature[26] both to give a flavour of the ideas involved and also because some of the implications of this literature would appear to have some relevance in appraising the migration behaviour in LDCs as well.

Much of the search literature, as is well known, is concerned with deriving 'optimal stopping rules' for search, commonly in the form of a 'reservation wage' which the searcher uses as a criterion for accepting or rejecting offers as they arise. In the simplest model, a number of key assumptions are made, in particular that searchers know the exact form of the wage distribution, but not the *order* in which they receive offer. Searchers conduct search while unemployed and receive offers at a constant rate over time. The optimal reservation wage is then calculated in a way such that the marginal cost of searching for an extra time period is equal to the marginal expected benefit of the offer (Lippman and McCall, 1976). 'Much of the literature on search is concerned with relaxing various of these assumptions (particularly the assumption that searchers know the parameters of the wage distribution), and examining the implications for the reservation wage.'

Now apropos of our current interest, Rogerson (1982) extends the standard search model to the spatial case by specifying a set of (known) independent wage distributions for each region, in addition to matrix of distance related costs. In the simplest case the individual chooses to search in the region with the highest reservation wage net of distance costs, and then chooses the first offer in that region which exceeds the reservation wage. David (1974), by contrast, concentrates on the expected *variance* of the offer distribution which confronts job searchers relative to the average offer. Suppose that (risk neutral) potential migrants have a given budget allocated to search activities which they must divide between an initial move and the subsequent extraction of offers at the point of destination. Having exhausted this budget allowance, the searcher selects the highest valued offer extracted over the course of the search process.

Under these circumstances, David shows that the potential returns to job search are greatest in the labour market with the widest dispersion of wages, relative to the average offer. Now given that (perceived) relative wage dispersion is likely to be greatest in large urban areas, this would suggest that job searchers are likely to be drawn to big cities as suitable sites for search activity.

Maier (1985) explicitly considers the case where individuals do not know the parameters of the wage distribution (although they might know its general form), but use the information from each offer to update their estimate of the regional wage distributions and revise their (estimate of) reservation wage accordingly. Explicit consideration of this possibility leads to two valuable insights: first, as Maier noted, there is likely to be a powerful distance deterrence function implicit in the process of acquiring information (particularly in the presence of risk aversion) above and beyond the simple costs of moving. Second, and more importantly, Maier recognized that uncertainty about regional offer distributions may deter individuals from undertaking immediate 'speculative' migration (i.e., migration undertaken in the *hope* of finding a suitable opportunity at the point of destination') and instead may lead them to invest in further information before moving or indeed inhibit movement altogether until they have actually *secured* a suitable opportunity at the point of destination (i.e., jobs are lined up prior to moving). Rogerson (1982), likewise, considers the case where although individuals may be aware of the parameters of regional wage distributions, they are uncertain as to whether or not they will receive an offer over a specified period. As Molho (1986) notes, 'both these sources of uncertainty, therefore, firstly about the parameters of the regional wage distribution ... and secondly about the probability of receiving an offer ... would suggest that for large section of the population *contracted* migration (i.e., migration undertaken after having already secured a suitable opportunity at the point of destination) is likely to be the more prevalent form of movement'.

Indeed, Gordon and Vickerman (1982) in their work concentrate specifically on the case of *contracted* migration. They construct a general decision making framework in which the probability of migration taking place is expressed in essence as the product of three main conditional probabilities, forming a hierarchical decision tree:

(1) The probability of being in search during a specific period, in a particular area;
(2) The probability, conditional on search, of receiving an opportunity of a specific type, from a specific area;
(3) The probability, conditional on receiving such an opportunity, of accepting it.

The first and third probabilities are strictly *choice* probabilities, i.e., they reflect the decisions of the individual. The second probability, however, is inherently different from the other two and reflects essentially (perceptions of) exogenous demand conditions in terms of the spatial distribution of opportunities at any point in time. Partitioning migration decision in this way

thus allows for explicit incorporation of exogenous demand side factors in determining the pattern of migration flows and integrates demand side influences into the individual decision making process.[27]

To conclude, the search model outlined here would be seen to lead to the following two important predictions:

(1) first that for large section of the population, 'contracted' rather than 'speculative' migration is likely to be the more prevalent form of movement, and
(2) second that the pattern of migration would be affected by the spatial distribution of job generation (i.e., flow of opportunities) as well as the relative variances in pay-offs to migration in different areas in addition to variables such as wages and unemployment.[28]

Both of these predictions will be seen to have some relevance when we come to set out alternative migration functions in Section 9 below.

8. Role of family in the migration process

We have so far in our discussion concentrated exclusively on the individual and ignored the influence of family members and their role in the migration process. In many communities, however, the migration of one member of a family is often a family decision and recent survey and field studies that provide a microview of migration in developing country setting strongly suggest that interdependencies between family members and the existence of ties with the place of origin are of great importance in understanding the role of migration in the context of socioeconomic development.[29] It would therefore appear desirable to study migration in the context of the family as well and in recent years a few studies of migration in both developed and developing countries have attempted to, or stressed the need to, study migration in such a context.

Mincer (1978) and Polachek and Horvath (1977) in their works discuss family considerations in migration decisions in the context of a nuclear family (in which both husband and wife work). Mincer's analysis starts from an explicit recognition that net family gain rather than net personal gain motivates migration of households. In arriving at a decision the family takes into account potential earnings changes of both partners. If moving to a particular destination involved a gain in earnings of only one partner and a loss in earnings of the other, the family would not migrate unless the absolute value of the gain was greater than the absolute value of the loss. If, as is generally the case, more than one destination is open to potential migrants, the family would move to that destination where the sum of gains of both earners is the greatest. At this destination it is quite possible that neither earner is maximizing individual gains. Both lose relative to their private potential, but gain as a family. However, Mincer argues, if the optimal family location decision involves a privete location opportunity loss which outweighs the gains from marriage for each of the

partners, the family dissolves and each of the spouses follows his or her (old or new) private optimal location. 'The theorem that families move whenever family gain is positive and stay when it is negative must, therefore, be amended. The sign of the family gain is a necessary, but not a sufficient, condition for the decision to move or not to move as a family.'[30]

The choice of the nuclear family as the unit of analysis in Mincer's model is mainly for analytical convenience and the model is also applicable to other family structures. However, an important assumption of Mincer's model is that migration involves the movement of the entire family. Migration of an individual member or a part of the family is viewed as an expression of individual maximization which results in the dissolution of the family as an integrated unit. This, however, would not be an accurate evaluation of migration in many LDCs where in large number of cases rural–urban migration does not involve the movement of the entire family but only of individual members who, however, continue to retain strong bonds with the family members left behind in the Rural sector. Sociologists[31] have argued that the households established by such migrants in the urban area are not autonomous entities but extensions of the rural households, with the family in such cases acquiring a multi-centred character in place of the former unicentredness and the close bonds between the different components of the family being reflected in regular transfer of resources, frequent visits, and occasional movement of persons from one unit to the other. Family integration, in other words, is maintained in ways other than by forming a domestic group.

Banerjee (1981) has likened the behaviour of a multi-centred family to that of a firm which is engaged in multi-stage or multi-product production process and finds it more profitable to set up its plants at various locations rather than to carry out the entire production under one roof. The family, likewise, allocates its labour over space so as to maximize net family gains. 'Let Y_r^f be the earnings of the rural family before migration; Y_r^h, the earnings of the members left behind in the rural household; Y_u^f, the sum of potential earnings of all members of the family in the urban centre; Y_u^h, the earnings of the migrants in the urban centre; C_r^f, the cost associated with the entire family being in the rural area; C_r^h, the cost of keeping some of the family members in the rural area; C_u^f, the cost associated with the entire family being in the urban centre; and C_u^h, the cost of the migrant household in the urban centre. The multicentredness of a family implies:

$$(Y_r^h + Y_u^h) - (C_r^h + C_u^h) > (Y_r^f - C_r^f) \quad \text{and} \quad > (Y_u^f - C_u^f).'$$

Writers have commonly viewed migration involving multi-centred family as a means of accumulating surplus for the purpose of meeting specific rural needs: see Guglar (1969), Garbet (1972), and Stark (1978, 1980, 1981, 1982, 1984) among others. Stark, in particular, in a series of papers has looked at migration decision and accumulation of surplus in the context of a small-farmer family which attempts to transform its 'familial' into 'capitalist' production. (Alternatively it may be supposed that the small-farmer family has a strong desire to innovate.) In either case, such a family faces two major constraints.

First, there is the 'investment capital' constraint. The small farmer family with its existing resource endowment and mode of production is unlikely to possess or generate in sufficient quantity the investment funds required for successful transformation (e.g., to high yielding varieties). The second constraint is that of risk: while the small farmer family is assumed to be risk-averse, the transformation to a new technology increases the subjective risks involved in agricultural production. And in the absence of smoothly functioning credit and insurance markets, it is the small farmer family itself which has to reorganize its own resources to overcome these constraints. 'It is here that rural-to-urban migration by the most suitable family member ... comes into the picture. In by-passing the credit and insurance markets (with their bias against small farmers) migration facilitates the transformation; it succeeds in doing this via its dual role in the accumulation of investment capital, usually generating significant urban-to-rural flows of remittances, and through diversification of income sources in controlling the level of risk.'[32]

The aversion-to-risk and surplus accumulation thus appear as major causes of rural–urban migration in this framework. Stark (1984) also shows that if aversion-to-risk exists and family rather than individual is the relevant decision-making unit, then the predicted level of rural-urban migration will be higher than if the individual were making the decision on his own.

Mention should also be made in this context of a recent paper by Bhattacharyya (1985) where she compares and contrasts individual and family migration decisions within the confines of probabilistic migration model. Under a particular set of behavioural and institutional assumptions, she shows that in her model, in the case of family migration decision, the expected wage differential between the urban and the rural sectors is neither necessary nor sufficient to induce migration and that there might, therefore, be a conflict between the individual and the family migration decisions. She also conjectures that 'the effectiveness of all types of government policy for controlling migration may be overestimated if only individual decisions are taken into account as a motivation for migration (and family decisions are ignored)'.

To conclude, the role of family in migration decisions is likely to be considerable and any analysis of the socio-economic consequences of migration that ignored the role of the family and concentrated only on individual can only be partial. Thus by facilitating the accumulation of surplus, for example, migration in the context of the family can have a powerful and beneficial effect on the Rural sector. Also when the social network of migrants includes the rural area, rural residents are likely to have better information about job vacancies in the urban area. During the periodic visits by migrants to their places of origin, for example, rural residents can learn about the prevailing state of the urban labour market; they can also ask urban-based migrants to look out for suitable vacancies and inform them of impending recruitment plans. Job search, in other words, need not be entirely urban based and prospective migrants can also engage in rural based search for urban jobs. The possibility of the mismatch of expectations and subsequent experience of new migrants in the urban area is also

likely to be greatly reduced when close contacts exist, between rural residents and established migrants in the urban area.

9. Informal sector, dual migration streams and non-probabilistic migration functions

We have now provided a reasonably comprehensive survey of the theoretical literature associated with the Todaro and the Harris–Todaro models. We have also looked at the implications of search theory for migration decisions and examined the role and importance of family considerations in migration decisions. Our aim in this section is to take a closer look at the Informal sector and its role in the migration process.

Now in most theoretical works, the Informal sector is viewed primarily as an absorber of surplus labour, rather than also as a producer of output at the same time; it is modelled as an unproductive and stagnant sector, serving as a refuge for the urban unemployed and as a receiving station for newly arriving rural migrants on their way to the Formal sector jobs: see, for example, the works of Todaro (1969), Fields (1975), Mazumdar (1976, 1977), and Lal (1973), among others. Fields, for example, takes the Informal sector output to be fixed at some level; Mazumdar, likewise, restricts the scope of the Informal sector when he assumes that the Informal sector sells its output only to members of the labour force in the urban area while the Formal sector sells its output to population outside the labour market; Lal is typical of the model builders when he assumes that the Informal sector is 'characterized by high labour-turnover' and 'provides some income for the migrants while they are searching for an "organized" (industrial) sector job'.

In sharp contrast to this view which sees the Informal sector as a stagnant sector, there is the view, based on wide empirical support, which sees the Informal sector as dynamic, efficient, and full of hidden but creative entrepreneurial talents.[33] Empirical findings have also recently become available which suggest that many migrants from the rural to the urban area are attracted by income-earning opportunities in the Informal sector itself; also that there is very little job search activity by the workers in the Informal sector.[34] A recent reviewer of a collection of essays on the nature and the role of the Informal sector in several LDCs summed up much of this evidence as follows: 'In short, the informal sector is not primarily a transit camp for disappointed migrants queuing for formal sector jobs, but a dynamic sector making substantial contributions to income and output, capable of attracting and sustaining labour in its own rights.'[35] Empirical findings also suggest that a large number of migrants who enter the Formal sector 'line up their jobs from the Rural sector itself'.[36]

It would thus appear that there is a gap between existing theories and the available evidence and consequently room for alternative theoretical frameworks. The present writer has elsewhere (Bhattacharya, 1985) presented and analysed a three-sector general equilibrium model of LDC where an

Informal sector with its own dynamics is explicitly introduced. The writer has also presented alternative migration functions to the ones usually employed in the literature and I now briefly describe our three-sector economy and set out our alternative migration functions.

We have the following three sectors in our Less Developed Economy: the Rural sector (R-sector) which, as the name implies, is located in the rural area; and the Formal and the Informal sectors (F- and I-sectors, respectively), both located in the urban area. The people in the Rural sector are divided into two groups: those who own land and those who do not. We call the former the rural hirers (R_H) and the latter, the manual labourers (ℓ_m). In the urban area, the distinction between the Formal and the Informal sectors is based on the fact that due to the existence of the Minimum Wage Act, a firm in the urban area which employs more than a specified number of workers is required to pay a wage which is 'institutionally' determined and is above the free market wage: the Formal sector in this economy then consists of all such firms. The Informal sector, by contrast, consists of firms which obtain labour at the free market wage. The Informal sector is also characterized by ease of entry. Within the Informal sector itself, however, a distinction is also made between two kinds of unit and two kinds of output that they respectively produce. First, there is the output produced by a group of I-sector workers which is directly consumed by the people in the F-sector: the services of shoe-shine boys, domestic servants, etc., are examples of this. We call this segment of the I-sector Informal Services (I_S) to distinguish it from the other segment of the I-sector which we call Informal Manufacturing (I_M). Output of the firms in the I_M segment is used by the F-sector as input.[37] People employed in the F-sector do not directly consume I_M-goods as they are perceived to be inferior; however, if the F-sector lends its 'brand name' to I_M-goods, I_M-goods are thereby transformed to F-goods and are consumed by such people. In equilibrium, income of the workers in the I_S and I_M segments are equal.[38] Finally, so far as consumption demand is concerned, it is assumed that (a) the rural hirers consume R- and F-goods; (b) the employers and employees in the F-sector consume R-, F-, and I_S-goods; but that (c) the $\ell_m s$ and the workers in the I-sector cannot, due to their low earnings, consume high priced F-goods; and they consume only R-goods.

The economy just described is then modelled formally. The static model contains 6 equations in 6 unknowns. (The unknowns are the price of the Rural sector output, the wage in the Rural sector, the number of firms in the I_M-sector, the price of the I_M-sector output, the wage in the Informal sector, and employment in the Formal sector). The model is seen to be block-recursive with changes in the Rural sector, at any given time, having no effects on profit or employment creation in the urban area. The model, however, has a fundamental asymmetric feature in that while changes in the Rural sector have no effects on the endogenous variables of the urban area, changes in the urban area do affect the endogenous variables of the Rural sector, and these implications of the model, I have noted in Bhattacharya (1985, 1991a) are in direct contrast to the fundamental implications of the Lewis-type models which suggest that

agricultural development is a pre-requisite to industrial development and that it is agriculture which must necessarily provide resourcees for industrialization.[39] The model also questions the conventional wisdom that decreases in the Formal sector minimum wage and increases in the maximum size of firm above which this minimum is enforced will help workers in the Informal sector, the essential argument being that these policies may have adverse terms of trade effects on the Informal sector that offset their favourable labour market effects. Migration is introduced in the dynamic version of the model and I now briefly set out below our alternative migration functions.

Non-probabilistic migration functions. We divided the people in the Rural sector into two groups, viz., R_H and ℓ_m. The people who look for jobs in the urban area are similarly divided into two categories: the H-type workers consisting of all those who have friends and/or relatives working in the Formal sector,[40] and the L-type workers consisting of those who have no such 'contacts' in the Formal sector. It is next assumed that those of the R_H who search for jobs located in the urban area form part of the H-type, while $\ell_m s$, if they migrate to the urban area, form part of the L-type. If now the number of H-type workers exceeds the number of vacancies in the Formal sector, then it would seem reasonable to expect that an F-sector employer would not hire L-type workers till all the H-type workers have been employed first; in which event the objective probability of an ℓ_m migrant, an L-type worker, securing a Formal sector job would be zero. In that case[41] if an $\ell_m s$ migrates to the urban area he does so because the Informal sector wage, v, is higher than his rural wage, w, and the amount of rural–urban migration by ℓ_m in our model then becomes a function of the difference between v and w, and is expressed as

$$F_m(v_t - w_t)m_t,$$

where m is the total number of manual labourers ($\ell_m s$).[42] That is, the proportion of ℓ_m who migrate from the rural to the urban area is a function of the difference between v and w, and the greater the difference the greater will be this proportion. There are both psychological and other costs involved in migration, and while some ℓ_m will migrate if v is marginally higher than w, others, perhaps of less adventurous spirit or more attuned to the rural way of life, would be motivated to migrate only if the difference between v and w is very much greater. Potential migrants, in other words, have different levels of inertia in the face of a given difference between v and w, so that the greater the difference between v and w the greater will be the proportion of $\ell_m s$ who would actually migrate.

So far as the migration behaviour of the other group of people in the Rural sector, viz., the rural hirers are concerned, it is assumed that the rural income of an R_H is higher than the Informal sector wage, v, so that if an R_H goes to the urban area he does so either to work in the Formal sector or to look for jobs in that sector, and not to work in the Informal sector. However, it seems unreasonable to expect that an R_H would give up the security of the ownership of his land when he goes to the urban area to search for Formal sector jobs.

Instead, the following scenario is visualized: an R_H has friends and relatives who work in the Formal sector, and they keep him informed of the vacancies that arise in the Formal sector. He can, therefore, if he so wishes, 'search' for F-sector jobs even from the rural area, and his search cost is zero. If, on the other hand, he goes to the urban area to search for F-sector jobs, his search is financed by his relatives in the Rural sector.[43] They do so on the understanding that if he is successful in securing a Formal sector job and moves *permanently* to the urban area, then the rights to income from his landholding would accrue to them, while if he is unsuccessful and returns to the rural area, then the land would revert back to him. His search cost in this case too, therefore, is zero. And since this search cost is zero, irrespective of whether he searches from the rural area or from the urban area, it is immaterial, for our purpose, whether he searches from the rural area or from the urban area. What is important is that if the Formal sector wage, v^*, is higher than his rural income, Π_h, then there is an incentive for an R_H to search for an F-sector job, and the greater the difference between v^* and Π_h, the greater will be the proportion of rural hirers who would search for such jobs. The actual number of hirers who search for F-sector jobs is then expressed by the following function:

$$F_H(v^* - \Pi_{h_t})h_t,$$

where h is the total number of hirers. Now, of course, only a fraction of these hirers who search will in fact secure F-sector jobs since, quite apart from the fact that the number of F-sector jobs available may be less than the number of R_H searchers, there will be other H-type candidates — the urban born H-types — who would also be searching for F-sector jobs, and a proportion of the available jobs would go to these other candidates. The share of R_H searchers in the total number of H-type candidates would therefore determine the proportion of the available F-sector jobs that would be secured by the R_H searchers. The actual number of R_H searchers who secure F-sector jobs can then be easily expressed by the following function:

$$g\left[\frac{F_H(v^* - \Pi_{h_t})h_t}{H_t}\right](f_{t+1} - f_t),$$

where f is the number of workers employed in the Formal sector and H is the total number of H-type candidates.[44] And given these migration functions, the equation for the growth of labour force in the urban area is easily written as:

$$L_{t+1} - L_t = \beta_L \cdot L_t + F_m(v_t - w_t)m_t + g\left[\frac{F_H(v^* - \Pi_{h_t}) \cdot h_t}{H_t}\right](f_{t+1} - f_t),$$

where L is the total number of workers in the urban area and β_L is the natural rate of increase of labour in the urban area.

Now these migration functions, as is to be expected, have welfare and policy implications very different from those of the Harris–Todaro type models. In particular, it can be seen that if the ℓ_m and the R_H migrate to the urban area according to the migration functions set out here, then rural–urban migration

in our model does not contribute to urban unemployment in any meaningful sense. Instead, such migration is seen to contribute to increase in output in both the Formal and the Informal sectors (the Formal sector output increases because increase in labour supply to the urban area, ceteris paribus, leads to decrease in the wage in the Informal sector, hence to decrease in the price of the I_M-sector output and therefore to *increase* in profit and investment in the Formal sector.[45]) Indeed, it is also by such migration that the landless labourers in the Rural sector (i.e., $\ell_m s$) are most likely to be able to improve their income, especially if the benefits of technical progress in the Rural sector pass them by. We are, therefore, inevitably led to question the gloomy view of rural–urban migration reflected in statements such as: 'Intra-rural inequality is at once the main cause and serious consequence of rural–urban migration' (Connell *et al.*, 1976); 'migration is a contributory factor to underdevelopment in the Third World' (Todaro, 1979). Instead, in our model, rural–urban migration is seen to contribute more to economic welfare than to economic loss.[46]

A concluding note

We have now come to the end of our paper. Before we conclude, however, it might be useful to collect together some of the important points arising from and related to our study. Thus it would appear from our review that any proper analysis and evaluation of rural–urban migration should include, among others, the following considerations. First, it would appear that an Informal sector needs to be introduced into the discussion in an essential way. Once a dynamic and productive Informal sector is introduced into the analysis, the unemployment consequences of rural–urban migration on which so much attention has been devoted in the theoretical literature would appear to be greatly exaggerated. Second, it needs to be recognized that migrants are unlikely to be a homogeneous group and that migration flow is likely to consist of *at least* two distinct streams[47] with one group bound for Informal sector only. Clearly, it would be of great importance to know (i) how many from the rural area migrate to go to work in the Informal sector without any thought of obtaining jobs in the Formal sector, (ii) how many go to work in the Formal sector with jobs lined up from the rural area itself, (iii) how many come to urban area to search for Formal sector jobs and then return to the rural area if they fail to obtain Formal sector jobs, and finally (iv) how many migrate probabilistically as postulated by Todaro and Harris–Todaro. While it would be rash to deny on the basis of our present empirical knowledge that some might migrate probabilistically, it nevertheless would appear, on the basis of a good deal of empirical evidence available in recent years, that their number is likely to be relatively small and since a theory should deal with general and not with particulars, it would appear that the time probably has now come for emphasis to shift away from probabilistic models.[48] Third, in evaluating the impact of migration on overall development (especially on the rural sector), the role of family in migration decisions needs to be explicitly considered. The migration of one member of a

family is often a family decision and a rural family that sends a member to the urban area may raise its total income and diversify across sources of income. There are also other tangible and intangible benefits of migration in the context of family and we have touched on some of these briefly in section 8 above. Finally, it needs to be recognized that often migration itself accelerates economic development. Where scale and agglomeration economies are important, high levels of net migration or natural increase may improve economic opportunities inducing increased migration. Indeed, as we stated in conclusion of our model in Section 9 above, in our view, rural–urban migration is likely to contribute more to economic welfare than to economic loss.

Part of the reason, of course, why rural–urban migration is viewed unfavourably by many is the belief that urbanization has proceeded too fast in many contemporary LDCs and that many of these countries suffer from 'overurbanization'. Urban growth in these countries, it is argued, is the artificial result of an 'urban bias' in government policies — 'policies that set prices and make public decisions in ways that favour urban areas and concomitant industrial development more than their potential contribution to economic efficiency justifies'. However, as Egan and Benedick (1986) have so cogently argued in a recent paper, it is easy to overestimate the impact of these considerations. From huge primate cities to market towns, cities arise and grow because they offer advantages as locations to perform certain types of economic activity and while urban bias may account for some urban growth, that growth reflects other, more fundamental factors as well: economies of scale, agglomeration economies, and other efficiency-enhancing benefits that result from concentrating population and economic activity,[49] and as Egan and Benedick observe, 'if urban bias had never existed in public policies, there is reason to believe that the majority of the urban development we observe today would still exist'.

A related concern frequently voiced is that in many developing countries, the major cities, most prominently the capital cities are already too big and are inefficient and unmanageable. Of course, as cities grow in size, the costs per household of providing services such as sewage, water, and housing would rise. At the same time, new costs would arise from crowding people and activities together (e.g., pollution, crime, congestion). Nevertheless, such increases in cost would justify concluding that a city is too big only if costs are rising faster than benefits, for one must not forget that scale and agglomeration benefits are the primary reason for the existence of cities in the first place. Even if the costs of living in the urban area are higher than those of living in the rural area, if urban-induced increases in productivity are greater than the urban-induced increase in costs, then urbanization is still more efficient than a more dispersed pattern of settlement.

Unfortunately little empirical evidence is available on the ways in which either productivity or costs vary with city size. It is, however, worth noting here that a recent major study of Cairo which attempted to measure both the costs and benefits associated with the growth of a very large urban area — the Cairo region

is forecast to encompass 16.5 million in population in year 2000 — concluded that 'massive decentralization to non-economic locations cannot be justified on the basis of diseconomies or disamenities associated with Cairo's and Alexandria's size'.[50] And while it would be possible to quibble with some aspects of this study, its findings are nevertheless striking. The Cairo region is a very large urban agglomeration and 'if a case cannot be made there that urban development has proceeded too far, then caution should be exercised before the more typical primate cities in the developing world, involving a population of perhaps a million or two, should be assumed to be too big.'

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Notes

1. See, for example, Weber (1899).
2. See Banks (1967).
3. See Lucas (1977) for an excellent exposition. Our discussion in this section relies heavily on Lucas.
4. We are assuming that P is exogenously given ('small open economy' assumption).
5. Figures 1 and 2 are from Lucas (1977).
6. See Ranis and Fei (1961).
7. Todaro (1969), p. 142.
8. See also Srinivasan and Bhagwati (1975) in this context where they show that even a single wage subsidy (i.e., subsidy to one sector) can ensure full employment, but the equilibrium in this case will not correspond to a first best optimum. Also see footnote 17 below.
9. See Stiglitz (1974).
10. Heady (1988) shows how the Bhagwati–Srinivasan policy of equal subsidies to manufacturing and agriculture must be modified when taxation is restricted. McCool also considers the implications of budgetary cost and looks at the relative merits of various subsidy/tax packages. Blomqvist discusses optimal policies (as does Heady). Jha and Lachler have a slightly different concern: they derive a second best optimal plan with taxation of wages, capital and land incomes and allocation of public investment between the agriculture and the urban sectors in a dynamic HT world.
11. i.e., if a wage subsidy of $S = \overline{w}_m$ is given to both sectors, then optimality is reached.
12. See also Gang and Gangopadhay's (1985) recent note on Basu. Basu in his work assumed fixed relative prices. In their note, Gang and Gangopadhay introduced an aggregate demand curve into the analysis and therefore allowed prices to vary. Under homotheticity of preferences they show that (i) if the propensities of labour and nonlabour are the same to consume, then price flexibility does not change the Basu analysis (i.e., there is a range of subsidies that gets one to first best and the equilibrium is unique); and (ii) if the propensities differ, there is still a range of subsidies that gives Pareto efficiency, but each subsidy in this range leads to a different equilibrium.
13. See their footnote 2.
14. This possibility is allowed for by Harris–Todaro as well in the context of their model (see footnote 15 below).
15. HT, after showing that, 'the minimum wage causes a loss of employment and hence

output in both sectors' in their model, adds a footnote (their footnote 11): 'If $dN_A/dN_M < 0$, which we believe to be empirically unlikely, this statement would have to be modified. In such a case, increasing the minimum wage will decrease manufacturing employment but will increase agricultural employment and output. Unemployment will result from the imposition of a minimum wage but we can no longer assert that the level of unemployment will increase concomitantly with the level of the minimum wage.'

16. Corden–Findlay also observe that in their model an agricultural wage subsidy must improve welfare (over the laissez faire level) as long as there is any urban unemployment. However, Anam (1988) in a recent note has shown that this will not be valid if the shadow price of labour is negative, a possibility that cannot be ruled out in the context of the Corden–Findlay model.
17. Apropos of the question of wage subsidies in the context of HT type models, mention should also be made of the works of Calvo (1978), Quibria (1988) and Zylberberg (1985). Calvo in his extension of the HT model endogenizes the determination of the manfacturing wage through the actions of an urban trade union whose objective is to maximize the difference between its members' urban income and what they could obtain in the rural sector at the ruling wage. In contrast with the standard HT model, the urban-to-rural wage ratio tends to be harder to change in the Calvo model, so that some of the conventional policies that reduce urban unemployment (such as wage subsidy) have no effect. In particular, it is observed that in the Calvo model, a first-best optimum cannot be obtained without the imposition of some migration barriers (such as a tax). However, Quibria (1988) in a recent generalization of Calvo model has shown that if one assumes a different—a utilitarian — objective function for the trade union and also introduces an informal sector into the analysis, then it is possible to show that there does exist a first-best wage subsidy for the manufacturing sector and the government, by setting its policies correctly, can achieve a first-best optimum for the economy.

    Zylberberg (1985) in his generalization of HT model, follows a different route. He generalizes HT model in terms of fixed price temporary equilibrium à la Benassy (1975) and Malinvaud (1977) and shows that policy recommendations derived from the usual HT model are not valid when excess supply prevails in *both* the labour and the goods markets.
18. See Harris–Todaro (1970), p. 138.
19. Mention may also be made in this context of Beladi and Naqvi's (1988) paper where they show that incorporation of land as a scarce factor in the agricultural sector also partially rectify a damaging property of the HT model, namely that capital accumulation causes unemployment to rise whereas labour growth causes it to fall. (The major purpose of Beladi and Naqvi's paper, however, was to show that in the HT economy, economic expansion cannot be immiserizing.)
20. See also section 6 below.
21. For other interesting attempts at introducing dynamics in the Harris–Todaro model, see Robertson and Wellisz (1979), Jha and Lachler (1981), Stark and Yitzhake (1982), Gupta (1984). Also see Khan (1980) for a generalization of HT model in several directions. Khan relates urban to rural wages through a function that depends on the rural wage itself, urban unemployment, the common rental rate on capital, and a shift parameter. This particular formulation of wage determination includes as special cases the standard HT model, the Corden–Findlay model, the Calvo model (see footnote 17 above), and various wage-differential models.
22. Fields writes, 'Not only can he choose between staying in (or returning to) agriculture or being either employed or unemployed in the cities, but he can also voluntarily choose to be *underemployed* (our italics) in the urban murky sector (Fields' description of the informal sector) while looking for a better job.

    'Why don't all workers enter the murky sector? While underemployment in the murky sector yields a positive wage and unemployment pays no wage, the murky-sector income is likely to be earned at the cost of a somewhat reduced job-search opportunity. This may be simply because murky-sector workers have less time to look for modern sector jobs or for some other reason.'
23. Fields: '... if highly educated workers are hired preferentially for modern-sector jobs, the urban unemployment rate will be lower than if workers were hired randomly without regard to educational attainment. This is because preferential hiring reduces the number of jobs available to the uneducated, thereby lowering the probability of finding an urban job and inducing large numbers of them to remain in a move back to agriculture.' It should be noted that in Fields' model there is no problem of 'educted unemployment'.
24. The earlier Todaro (1969) specification had no job turnover at all (i.e., once a worker gets a job, he is assumed to keep it for life).
25. Mazumdar introduces the heterogeneity of migrants in terms of what he calls 'visitors' and 'regulars'. 'Visitors' have lower supply price than the 'regulars'; 'visitors' are those who come to town as individuals without any thought or plan of extended stay, e.g., the seasonal migrants. and they are interested in informal sector employment as an end in itself.' We shall argue, later, in Section 9, that even among the regulars, a large and increasing number would be interested in informal sector employment as an end in itself.
26. The literature review in this section relies mainly on Molho (1986).
27. Gordon–Vickerman framework can also of course be extended to encompass the case of speculative migration as well by allowing potential migrants the (continuous) option of conducting job search elsewhere should search from the original location prove unfruitful. See Molho (1986).
28. This latter prediction is important in the context of empirical specification of variables that are likely to affect migration. Thus mention may be made in this context of Lucas's (1985) recent study which sought to quantify some of the relationships advanced by Harris and Todaro (1970). 'Lucas estimates micro level wage and employment functions for different locations in Botswana, and uses these equations to predict earnings and employment probabilities in *all* locations for *each* individual. These predictions are then used to explain individuals *migration* probabilities on the hypothesis that individuals will move if their expected earnings (weighted by the employment probability) are greater elsewhere than in their current location. Thus, potential migrants effectively form expectations of their probability of finding a well-paid job on the basis of the experience of *similar* individuals living in the different areas, regardless of whether any such vacancies really exist in those areas.' This clearly represents a form of *speculative* migration, and it might be argued that given the poorer quality of information networks in LDCs, such a strategy might not be uncharacteristic of movements in LDCs. However, as Molho (1986) observes, it is not clear why potential migrants should have better information on the experience of similar individuals to themselves than on the flow of new job opportunities within this context.
29. See, among others, Collier and Lal (1984), Caces *et al.* (1985), Banerjee (1981), and Ulack (1986).
30. In their discussion of family migration, Mincer as well as Polachek and Horvath concentrate mainly on market earnings of the spouses. It has, however, recently been argued that the role of nonmarket household production (e.g., the caring for both children and the elderly in the home, enjoying the company and support of friends and relatives, etc.) may also be quite important in family migration decisions. In this context see, in particular, Shields and Shields (1989) for an interesting empirical study of family migration in Costa Rica which takes account of these nonmarket activities in migration decisions. Also see Schultz (1988).
31. See for example Shah (1973) and Chekki (1974).

32. Stark (1982).
33. See, for example. ILO (1972).
34. See, for example, Banerjee (1983), Deshpande (1983), Bhattacharya (1985, 1991b).
35. Scott (1982), p. 554. See also Bertrand and Squire (1980), Majumdar (1978) and Sethuraman (1976).
36. See, for example, Banerjee (1983).
37. Often there is subcontracting relationship between the F-sector and the I_M-firms.
38. The reason for making the distinction between I_S and I_M is that while the workers in I_S do not contribute anything to the production of output in the I_M, they, nevertheless, by their existence and growth, influence the labour cost in the I_M.
39. In our three-sector model, in contrast to the dual economy models, capital accumulation in the modern industrial sector — i.e., the Formal sector — does not depend on the availability of surplus labour from the Rural sector and, at any given time, the relative price of rural goods and changes in the rural wage have no effect on this capital accumulation or on employment creation in the urban area. Agricultural development in this model is not only not a pre-requisite to industrial development but that for substantial agricultural development to take place, industrial development itself may be a pre-requisite. These implications of the model, I have noted in Bhattacharya (1985, 1991a) are in accord with many of the recently revised ideas about the history of the English and the Japanese industrialization. See, in particular, Sinha (1984) for a succinct evaluation of recent researches on the role of agriculture in both the English and the Japanese industrialization.
40. The H-type workers, in other words, consist of all those who have close 'contacts' in and with the Formal sector; usually, though not necessarily, attainment of a certain level of formal educational qualification can be taken as a reasonably good proxy for 'contacts' in the Formal sector. For evidence that jobs in the Formal sector are usually secured through friends and/or relatives, see the references cited in Bhattacharya (1985), Ch. V.
41. The question of what happens if the objective probability of securing a Formal sector job differs from the subjective probability is discussed in Bhattacharya (1985, 1991b) and it is shown that nothing of significance alters.
42. That migration flow consists of two distinct streams has, of course, often been noted. Thus Connell *et al.* (1976), for example, noted that in India migration flow consists 'of both rich, educated villagers and poor, illiterate labourers ... Migrants come from two opposite ends of the educational scale, with a very high number of illiterates and a large number with secondary and higher education'. Migrants, in other words, consist both of what we have called the rural hirers ('the educated and the rich') and the landless labourers ('the poor and the illiterate'). The fact that landownership and education are correlated in the rural areas is widely acknowledged. Evidence also suggests that in the urban areas migrants who work in the Formal sector mostly come from better-off rural families. The landless labourers, however, do migrate to urban areas and given the findings that there is very little job-search activity by workers in the Informal sector and little or no mobility from the Informal to the Formal sector, one surely must conclude that they do so because the Informal sector wage is higher than their rural wage and not because, as the probabilistic models suggest, they wish to look for jobs in the Formal sector.
43. In practice, by the remaining members of his rural family. To avoid complication, the concept of family landholding is not introduced explicitly in the analysis, though its relevance is accepted implicitly.
44. H, in other words, consists of all the urban–born H-type workers plus all the hirers who are searching for F-sector jobs. A numerical illustration may help clarify our discussion in the text. Suppose that initially there are 100 rural hirers in our economy. Further that, given the difference between v^* and Π_R, 20 of them are searching for F-sector jobs. (As mentioned in the text, it does not matter whether they are searching from the rural area or from the urban area.) Also suppose that in this economy there are 40 urban-born H-type workers. If now, say, 12 jobs become available in the F-sector, then $(20/(20+40)) \cdot 12$ i.e., 4 of the 12 jobs would go to the rural hirers, and these 4 hirers who secure F-sector jobs would then move *permanently* to the urban area and we will be left with 96 rural hirers in our economy.
45. The Formal sector firms, it will be recalled, use the I_M-sector output as input in their production functions and so when the price of the I_M-sector output falls, their profit increases.
46. It may also be noted that, given out migration functions, the Shadow Wage Rate (SWR) in our model, even in the presence of rural–urban migration, should continue to be given by the original Little–Mirrlees (1969) formulation. This is in contrast to the question that has dominated the discussion in the literature, viz., whether the SWR in the presence of rural–urban migration should or should not equal the institutionally fixed 'minimum' wage in the Formal sector. Thus if the L-type workers can meet the labour requirements of the Formal sector and a worker is recruited from the Informal sector for the Formal sector job, then the SWR in our model should be given à la Little–Mirrlees by: $SWR = v^* - (v^* - v)/s$, where s is the premium on savings vis-à-vis consumption. See Bhattacharya (1985), Chapter V for a review of the relevant literature.
47. For some recognition of this in the literature, see Bhattacharya (1985), Connell *et al.* (1976), Cole and Sanders (1985). See also Banerjee and Kanbur (1981) and Heady (1987).
48. The proportion who migrate probabilistically (as indeed also the relative proportion of the other groups) would probably vary from country to country and more empirical evidence would clearly be welcome on this point.
49. One indication that cities play a positive role in national growth and development is the widely observed relationship between a country's level of urbanization and its GNP per capita. A recent statistical study of low- and middle-income countries, for example, found that those countries that had a higher percentage of the population in urban areas also had higher GNP per capita. For example, African countries with 10 percent of the population in urban areas had an annual GNP per capita of about $250 while at 35 percent urban, GNP per capita was $460 (see African Urban Indicators, Washington DC: PADCO, 1982, pp. A1–A14). Other studies have shown that large cities are more productive than small cities and also that there is a strong tendency for large cities and their surrounding core regions to be the most active, rapidly growing areas of developing nations (see Mera (1973) and Egan and Benedick (1986)).
50. National Urban Policy Study, Appendices, Washington DC, PADCO, 1981, p. 47. See also Alan G. Gilbert 'The Arguments for Very Large Cities Reconsidered', Urban Studies, 13, February 1976, pp. 27–34.

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