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A Model of Labor Migration and Urban Unemployment in Less Developed Countries

By MICHAEL P. TODARO*

The chronic problem of urban unemployment and underemployment in almost every contemporary developing country has received a relatively minimal degree of theoretical attention in the literature on economic development. However, even the most casual observer of these countries cannot help but be overwhelmed by the proportion of the urban labor force which is apparently untouched by the so-called "modern" economy. From Dar es Salaam to Karachi to Caracas, from land surplus to labor surplus to capital surplus countries, one hears of the ever-increasing flow of rural migrants into urban areas and of the inability of the urban economy to provide permanent jobs for even a majority of these workers.¹ And yet, in striking contrast to the sophisticated theories of unemployment in developed nations, there have been few attempts to formulate a realistic positive theory of urban unemployment for less developed countries.² In

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¹ W. A. Lewis stands out among development economists as one who has repeatedly called our attention to the seriousness of the urban unemployment problem [21] [22]. However, Lewis' discussions have been largely qualitative and have not provided any rigorous framework with which to analyze the mechanism of labor migration and urban unemployment.

² Eckaus' famous factor proportions model [6] represents the most notable attempt to come to grips in a rigorous fashion with the problem of labor absorption in the modern sector. However, his model is concerned

fact, one of the best known models of labor transfer and economic development does not even consider the causes or, for that matter, the implications of a large and rapidly growing pool of urban unemployed [23].

The objective of this paper is twofold. First, we shall formulate an economic behavioral model of rural-urban migration which, in our opinion, represents a realistic modification and extension of the simple-wage differential approach commonly found in the literature [16] [19] [23]. It does so by recognizing the fact that the existence of a large pool of unemployed and underemployed urban workers must certainly affect a prospective migrant's "probability" of finding a job in the modern sector. As a result, when analyzing the determinants of urban labor supplies, one must look not at prevailing real income differentials as such but rather at the rural-urban "expected" income differential, i.e., the income differential adjusted for the probability of finding an urban job. It will be argued that this probability variable acts as an equilibrating force on urban unemployment rates. Secondly, we shall incorporate this probabilistic approach into a rigorous model of the determinants of urban labor demand and supply which,

primarily with the demand side of the employment problem, and as such does not consider in an equally rigorous fashion the determinants of rural-urban labor supply. As a result, the model cannot be used to estimate the magnitude of urban unemployment nor can it be used to evaluate the unemployment implications of alternative policies.

when given values for the crucial parameters, can be used among other things to estimate the equilibrium proportion of the urban labor force that is not absorbed by the modern industrial economy. Additionally, the model will provide a convenient framework for analyzing the implications of alternative policies designed to alleviate unemployment by varying one or more of the principal parameters.

I. The Process of Labor Migration

It is a well-known fact of economic history that material progress usually has been associated with the gradual but continuous transfer of economic agents from rural based traditional agriculture to urban oriented modern industry [5] [27]. It is not surprising, therefore, to find the literature on economic development stressing the importance of similar structural changes in contemporary less developed nations [4] [20]. In particular, with respect to the occupational distribution of the indigenous labor force, economic development is often defined in terms of the transfer of a large proportion of workers from agricultural to industrial activities [24]. However, this process of labor transfer is typically viewed analytically as a one-stage phenomenon, that is, a worker migrates from a low productivity rural job directly to a higher productivity urban industrial job. The question is rarely asked as to whether or not the typical unskilled rural migrant can indeed find higher-paying regular urban employment. The empirical fact of widespread and chronic urban unemployment and underemployment attests to the implausibility of such a simple view of the migration process.

It is our opinion that a more realistic picture of labor migration in less developed countries would be one that views migration as a two-stage phenomenon. The first stage finds the unskilled rural worker migrating to an urban area and initially

spending a certain period of time in the so-called "urban traditional" sector.³ The second stage is reached with the eventual attainment of a more permanent modern sector job. This two-stage process permits us to ask some fundamentally important questions regarding the decision to migrate, the proportionate size of the urban traditional sector, and the implications of accelerated industrial growth and/or alternative rural-urban real income differentials on labor participation in the modern economy.

II. Employment Probability and the Decision to Migrate

In our model, the decision to migrate from rural to urban areas will be functionally related to two principal variables: (1) the urban-rural real income differential and (2) the probability of obtaining an urban job. Since it is this latter variable which will play a pivotal role in the analysis, it might be instructive at this point to explain briefly our reasons for incorporating this probability notion into the overall framework.

As pointed out above, an implicit assumption of typical labor transfer models is that any migrant who enters the modern sector is "absorbed" into the gainfully employed at the prevailing urban real wage. However, the important question to ask in this context is "how long" does the

³ For the purposes of this paper, the urban traditional sector will encompass all those workers not regularly employed in the urban modern sector, i.e., the overtly unemployed, the underemployed or sporadically employed, and those who grind out a meagre existence in petty retail trades and services. J. P. Lewis provides an excellent description of this traditional sector which consists largely of "the urban in-migrant who, instead of doing absolutely nothing, joins Bombay's army of underemployed bootblacks or Delhi's throngs of self-appointed (and tippable) parking directors, or who becomes an extra, redundant salesman in the yard goods stall of the cousin, who according to custom, is going to have to provide him with bed and board anyway" [18, p. 53]. This description aptly fits a typical city in Africa and Latin America as well.

average migrant have to wait before actually obtaining a job. Even if the prevailing real wage is significantly higher than expected rural income, the fact that the "probability" of obtaining a modern sector job, say within the next year or two, is very low must certainly influence the prospective migrant's choice as to whether or not he should leave the farm. In effect, he must balance the probabilities and risks of being unemployed or sporadically employed in the city for a certain period of time against the favorable urban wage differential. A 70 per cent urban real wage premium, for example, might be of little consequence to the prospective migrant if his chances of actually securing a job are, say, one in fifty. Nevertheless, even if expected urban real income is less than rural real income for a certain period following migration, it may still be economically rational from a longer-run point of view (e.g., from a discounted present value approach to the rural-urban work choice) for the individual to migrate and swell the ranks of the urban traditional sector. Our underlying behavioral model, therefore, will be formulated more in the spirit of permanent income theories than present wage differential theories.

To underline the fundamental role played by job opportunities and probabilities of employment in the actual migration decision-making process, we might cite two outstanding illustrations, one historical and one contemporary, which demonstrate the relative, and often overriding, importance of this variable. The first case concerns the movements of American unskilled laborers back and forth between agriculture and industry during the 1930 depression decade. In an extremely informative and well-documented study of American agriculture, Theodore Schultz [26] argues that in 1932 when urban wages were still considerably higher and falling less rapidly than rural wages, there

was a definite reversal of the historical flow of workers from the farm to the city. In fact, 1932 witnessed a net urban to rural labor migration [26, p. 90]. Schultz attributes this seemingly paradoxical phenomenon to the severe lack of job opportunities in depressed urban factories and the more likely prospects of finding agricultural employment in rural areas even though there still existed a significant positive urban wage premium [26, p. 99].

The second, more contemporary case concerns an interesting experiment carried out in Kenya in 1964. In a modified version of a tactic suggested by the International Labor Office [29] which advocated that governments of less developed countries employ and, through taxes and subsidies, induce private enterprise to employ more labor than would be worthwhile on the basis of a comparison between productivity and wages, the government of Kenya instituted a "tripartite agreement" among itself, private employers, and trade unions. The avowed intention was to wipe out the considerable unemployment existing in the greater Nairobi area by having the two hiring participants agree to increase their employment immediately by 15 per cent. For their part the unions had to agree to forego any demands for general wage increases. In his analysis of this "agreement" Professor Harbison has observed that:

The effort was a colossal failure. The private employers did take on additional workers and *this acted like a magnet attracting new workers into the urban labor markets*; in a few months the working forces in most of the private establishments had dropped to their former levels through attrition not offset by new hires. In the end, the volume of unemployment, as a consequence of the expansion of the modern labor force *in response to the prospect of more jobs* was probably increased rather than de-

creased [10, p. 183, fn**]. (Italics not in original)

Here once again we can recognize the basic influence exerted by the probability of finding a job (whether real or anticipated) on the supply of rural workers into urban labor markets. Moreover, the significance of anticipated job opportunities on urban labor supplies is underlined in the above case by the enforced stability of urban wages over this experimental period. This tripartite agreement, therefore, seems to have provided as excellent a *ceteris paribus* experiment as is normally possible in economic analysis. In terms of the model that we shall now present, the Kenyan experience would be interpreted as a rightward shift of the urban labor supply curve as a result of an anticipated increase in the probability of successfully locating a job in the modern sector.

III. A Behavioral Model of Rural-Urban Labor Migration

In order to understand better the nature of the supply function to be used later in the overall model of the determinants of urban unemployment, let us first set forth the underlying behavioral assumptions of our model of rural-urban migration.

1. We shall assume that the percentage change in the urban labor force as a result of migration during any period is governed by the differential between the discounted streams of expected urban and rural real income (defined below) expressed as a percentage of the discounted stream of expected rural real income⁴—i.e.,

⁴ As the reader will discover below when the overall model is presented, the reason for expressing migration as a percentage of the existing urban labor force rather than as an absolute number is that it greatly simplifies the mathematics without in any way altering the qualitative nature of our conclusions. Since we are interested in changes in unemployment rates over time, the crucial supply variable is the rate of increase in the urban labor force as a result of migration. The fact that equation (1) indicates that the same capitalized percentage earnings

$$(1) \quad \frac{\dot{S}}{S}(t) = F \left[\frac{V_u(t) - V_R(t)}{V_R(t)} \right], \quad F' > 0.$$

where,

- \dot{S} represents net rural urban migration;
- S is the existing size of the urban labor force;
- $V_u(t)$ is the discounted present value of the expected urban real income stream over an unskilled worker's planning horizon; and,
- $V_R(t)$ is the discounted present value of the expected rural real income stream over the same planning horizon.

2. The planning horizon for each worker is identical.

3. The fixed costs of migration are identical for all workers.

4. The discount factor is constant over the planning horizon and identical for all potential migrants.

Given these initial assumptions, our behavioral urban labor supply model can be formulated in the following manner.

First, for $V_R(0)$, we have:

$$(2) \quad V_R(0) = \int_{t=0}^n Y_R(t) e^{-rt} dt$$

where,

- $Y_R(t)$ represents net expected rural real income in period t based, say, on the average real income of x previous periods,⁵ and
- r is the discount factor reflecting

differential might lead to different absolute numbers of migrants at different times is reasonable as long as (a) the geographic distribution of the total population is heavily rural based and (b) the natural rate of rural population growth exceeds that of urban population growth. Both of these assumptions are generally valid for less developed nations.

⁵ Thus, for example, one might anticipate expected rural incomes to decrease following periods of crop failure due to weather and pest variations. In our model, this would show up as an initial increase in migration equilibrated by a lower probability of finding an urban job which in turn lowers expected urban incomes as well.

the degree of consumption time preference of the typical rural unskilled worker.

Next, for $V_u(0)$, we have:

$$(3) \quad V_u(0) = \int_{t=0}^n p(t) Y_u(t) e^{-rt} dt - C(0)$$

where,

$Y_u(t)$ represents net urban real income in period t ,⁶

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

and,

$p(t)$ is the probability of having a modern sector job in period t [defined below].

The distinguishing characteristic of equation (3) is that "expected" urban real income in any period t varies directly with $p(t)$, the probability of having a job in that period.⁷ Thus, one could easily conceive of a situation in which the urban-rural real income differential, $Y_u(t) - Y_r(t)$, was positive while the "expected" differential, $p(t)Y_u(t) - Y_r(t)$, was negative.

Let us now consider the nature of $p(t)$. However, in order to give $p(t)$ a precise and intuitively plausible definition, it is necessary to look once again at the urban labor market and, in particular, the migration process. For analytical convenience, we shall picture the typical rural migrant, therefore, as arriving in the urban area and joining a large pool of unemployed and

underemployed workers who arrived in town earlier and still are waiting for a modern sector job. 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 this 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, we 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,

$$p(1) = \pi(0) + (1 - \pi(0))\pi(1)$$

that is, the probability of having a job in period zero (the time of migration) is equal to the probability of immediate selection from this pool, while the probability of having a job in period 1 is equal to the probability of being selected in period zero *plus* the probability of being selected in period 1. Generalizing, we see that for any period, t ,

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

or,

$$(4) \quad p(t) = \pi(0) + \sum_{i=1}^t \pi(i) \prod_{j=0}^{i-1} (1 - \pi(j))$$

where

$$\prod_{i=1}^n a_i = a_1 \cdot a_2 \cdot a_3 \cdot a_4 \cdot \dots \cdot a_{n-1} \cdot a_n.^8$$

⁸ One of the benefits of formulating the job selection process in this manner is that it captures an essential feature of the earnings history of a typical migrant,

⁶ $Y_u(t)$ is intended as a proxy variable for all elements that constitute urban real income, i.e., wages, cost of living, urban amenities etc. For example, Y_u might equal aw/p where w is the urban wage, p is the urban price deflator, and $a > 1$ is scalar proxy for "city lights" and other amenities.

⁷ Our reason for not including a similar probability variable in (2) is that the existence of traditional crop-sharing activities and the so-called "extended family" system largely negates the potential impact of such a variable in the rural economy whereas these ties are much more difficult to maintain in a wage-oriented urban economy. However, it would not be difficult to incorporate, say $P_R(t)$ into equation (2).

In order to complete our behavioral model, we must now define $\pi(t)$ in some meaningful economic sense. We shall define this 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 .⁹ But this procedure necessitates the introduction of a demand expression to reflect job creation in the modern sector. For the purposes of this paper, therefore, we shall assume initially that the number of new jobs created increases at a constant exponential rate over time. Specifically

$$(5) \quad N(t) = N_0 e^{(\lambda - \rho)t}$$

where

$N(t)$ is total modern sector employment in period t ,

λ is the rate of industrial output growth, and

ρ is the rate of labor productivity growth in the modern sector.

Thus, if we let the rate of job creation $\gamma = \lambda - \rho$, we have

$$(6) \quad \pi(t) = \frac{\gamma N(t)}{S(t) - N(t)}$$

IV. An Analytical Model of the Structure and Mechanism of Urban Labor Markets

We can now bring some of the above concepts together and formulate our over-

namely, that the path of expected urban earnings is positively related to the length of time that a migrant has been in the urban area *ceteris paribus*. The longer a migrant remains in the urban area the more contacts he can establish and the more likely he is to be holding a job after a certain period of time. In terms of equation (4) $p(t) \rightarrow 1.0$ as $t \rightarrow \infty$.

⁹ Since there will be other new migrants entering the labor pool during period t , the actual *realized* probability will be somewhat less than the expected probability at the time of choice (the latter being the more relevant criterion for migration). However, this slight differential will not affect our results or conclusions.

all model of disturbances and adjustments in the urban labor markets of less developed countries. The model can be specified in the following manner. Once again, let

$N(t)$ total employment in the urban modern sector in period t ,

$S(t)$ total urban labor force in period t

and, therefore,

$S(t) - N(t)$ measures the size of the urban traditional sector. We first have our exponential demand equation,

$$(7) \quad N(t) = N_0 e^{\gamma t}, \quad \text{or}$$

$$(7a) \quad \frac{\dot{N}}{N}(t) = \gamma$$

where,

$$\gamma = \lambda - \rho.$$

Next, we specify an aggregate labor supply equation which is a simplified version of equation (1) in the sense that only a one-period time horizon is assumed.¹⁰

$$(8) \quad \frac{\dot{S}}{S}(t) = \beta + \pi(t)F\left[\frac{Y_u(t) - Y_R(t)}{Y_R(t)}\right]$$

or, letting

$$\alpha(t) = \frac{Y_u(t) - Y_R(t)}{Y_R(t)},$$

$$(8a) \quad \frac{\dot{S}}{S}(t) = \beta + \pi(t)F(\alpha(t))$$

where,

β is the natural rate of increase of the urban labor force,

$\alpha(t)$ is the percentage urban-rural real income differential, and, is

$F(\alpha(t))$ a function that such $dF/d\alpha > 0$.

Thus, $\pi(t)F(\alpha(t))$ is the rate of urban labor force increase as a result of migration, i.e.,

¹⁰ This assumption is made necessary by mathematical convenience but is in fact probably a more realistic formulation in terms of actual decision making in less developed nations. In any case, the general conclusions are not sensitive to the assumption.

we are assuming that migration varies directly with the probability of finding a job. Furthermore, from equation (6), we know that

$$\pi(t) = \frac{\gamma N(t)}{S(t) - N(t)}.$$

Substituting for $\pi(t)$ we have, therefore,

$$(9) \quad \frac{\dot{S}}{S}(t) = \beta + \frac{\gamma N(t)}{S(t) - N(t)} (F\alpha(t)).$$

We shall assume, initially, that this income differential $\alpha(t)$ remains constant over time, i.e. $\alpha(t) = \alpha$.

Finally, we denote the proportion of the urban labor force employed in the modern sector at time t as $E(t)$, where

$$(10) \quad E(t) = \frac{N(t)}{S(t)}.$$

Before solving for equilibrium conditions, let us first give a brief verbal explanation of the mechanics of the model represented by equations (7a), (9), and (10).

Suppose we consider a developing economy in the very early stages of industrialization such that almost the entire population resides in rural areas. The urbanization process is just beginning to accelerate but as yet the pool of urban unemployed is relatively small so that the probability of obtaining a job is high. Therefore, given a significantly positive urban real wage premium ($\alpha > 0$)¹¹ and a positive rate of

urban job creation exceeding the natural rate of urban population growth ($\gamma > \beta$), the resulting urban expected real income differential induces rural-urban migration such that the urban labor force grows at a faster rate than that of job creation—i.e., $\beta + \pi(t)F(\alpha) > \gamma$. This more rapid growth of labor supply results in an increase in the relative size of the urban traditional sector with the result that *ceteris paribus* the probability of a rural migrant finding a job in the next period is somewhat lower ($\pi(t+1) < \pi(t)$). Assuming α and γ remain constant, this lower probability should result in a slowing down of the rate of urban labor force growth although \dot{S}/S may continue to exceed \dot{N}/N . Eventually, however, the equilibrating function of π stabilizes the urban unemployment rate at some level $1 - E^*$ depending upon the values of α , β , and γ . If the unemployment rate falls below $1 - E^*$ equilibrating forces in the form of rising π 's will be set in motion to restore the equilibrium. Thus, for any given values for our principal parameters, the equilibrium will be stable. Moreover, as we shall discover below, policies designed to eliminate unemployment by raising γ (e.g., by increasing the rate of industrial expansion and/or subsidizing labour in accordance with shadow price criteria) without a concentrated simultaneous effort at lowering the real earnings differential α will meet with increasing frustration. But now let us turn to a more rigorous demonstration of these and other conclusions.

The equilibrium condition for our model is defined simply as that employment rate

recognized the fact that in numerous cases unskilled workers in the modern sector are earning three and four times as much as the average small farmer [21, p. 12]. He attributes this disproportionate disequilibrium to the combined effects of trade union pressure, nationalistic government sympathy for the trade union cause, and a new social conscience on the part of big entrepreneurs. Whatever the reasons, these real-earnings distortions are a major cause of the urban unemployment phenomenon.

¹¹ Considerable debate has been generated in the literature as to whether this wage differential is in fact a real income differential. Lewis has argued that a positive money wage differential of the order of 50 per cent is necessary to induce workers to migrate from rural to urban areas [19] [22]. But this does not necessarily imply a corresponding real wage differential. Hagen [8] has argued and provided empirical evidence that this differential is in fact a distorted real-income differential resulting from disproportionate growth rates in manufacturing versus agricultural activities. See also comment by Koo [17], Hagen's reply [9], and remarks by Bhagwati and Ramaswami [2]. Recent empirical evidence has tended to confirm the real-income differential hypothesis [25] [13] [1] [12] [28] and Lewis himself has

E^* such that $\dot{E}/E(t)$ equals zero, that is, where

$$(11) \quad \frac{\dot{E}}{E}(t) = \frac{\dot{N}}{N}(t) - \frac{\dot{S}}{S}(t) = 0.$$

Now, from equations (7a) and (9) we know that

$$\frac{\dot{E}}{E}(t) = \gamma - \beta - \frac{\gamma F(\alpha) N(t)}{S(t) - N(t)} = 0$$

where,

$$(12) \quad \gamma - \beta = \frac{\gamma F(\alpha) N(t)}{S(t) - N(t)}.$$

Dividing both numerator and denominator of the right-side term of (12) by $S(t)$ and substituting from (10) we obtain:

$$(13) \quad \gamma - \beta = \frac{\gamma F(\alpha) E^*}{1 - E^*}.$$

Rearranging,

$$\gamma - \beta - (\gamma - \beta)E^* = \gamma F(\alpha)E^*$$

$$(17) \quad \frac{\gamma + d\gamma - \beta}{F(\alpha)\gamma + \gamma dF(\alpha) + F(\alpha)d\gamma + dF(\alpha)d\gamma + \gamma + d\gamma - \beta} = \frac{\gamma - \beta}{F(\alpha)\gamma + \gamma - \beta}$$

or, finally:

$$(14) \quad E^* = \frac{\gamma - \beta}{\gamma F(\alpha) + \gamma - \beta}.$$

Alternatively, the equilibrium proportionate size of the urban traditional sector, $T^* = 1 - E^*$, is simply:

$$(15) \quad T^* = 1 - \frac{\gamma - \beta}{\gamma F(\alpha) + \gamma - \beta}.$$

Furthermore, this is a stable equilibrium since from

$$\frac{\dot{E}}{E} = -\frac{\gamma F(\alpha) E}{1 - E} + \gamma - \beta = 0$$

we may show the derivative in (16) to be negative.

$$(16) \quad \frac{d\left(\frac{\dot{E}}{E}\right)}{dE} = -\frac{(1 - E)\gamma F(\alpha) + \gamma F(\alpha)E}{(1 - E)^2}$$

where

$$0 \leq E \leq 1.$$

It is evident from equation (15) that the proportionate equilibrium size of the urban traditional sector (T^*) will vary directly with the urban rural percentage real income differential, $(\partial T^*/\partial \alpha > 0)$, and inversely with the rate of job creation $(\partial T^*/\partial \gamma < 0)$. Moreover, it is interesting to note that an increase in the rate of industrial output growth (λ) which in turn increases the growth rate of modern sector employment opportunities (γ) might have no impact on cutting into the proportionate size of the urban traditional sector if the urban real wage differential (α) also increases by a certain amount. Specifically, $dE^* = 0$, if, equation (17) holds,

or, solving for $d\gamma$, if

$$(18) \quad d\gamma = \frac{-\gamma^2 dF(\alpha)}{\gamma dF(\alpha) - \gamma\beta - F(\alpha)\beta - \beta dF(\alpha)}.$$

For example, suppose the growth rate of modern sector employment is 4 per cent ($\gamma = .04$), the natural rate of urban labor force growth is 2 per cent ($\beta = .02$), the urban-rural real earnings differential is 100 per cent ($\alpha = 1.0$), and, for simplicity $F(\alpha) = \alpha$. Given these parameters equation (14) says that, in equilibrium, modern sector employment would absorb only one-third of the urban labor force. Now suppose that the earnings differential between modern urban jobs and traditional agricultural work increases by an additional

20 per cent, i.e., $d\alpha = dF(\alpha) = 0.20$. Equation (18) of our model says that the rate of modern sector job creation must grow by an additional 1.9 per cent (i.e., $d\gamma = .019$) just to prevent the equilibrium employment rate from falling below its original level. Moreover, when it is recalled that $\gamma = \lambda - \rho$ and we recognize the fact that in order to increase employment growth (γ) by 2 per cent, the growth rate of modern sector output (λ) will probably have to increase by at least an additional 6 per cent due to the positive correlation between output expansion and productivity growth,¹² we begin to appreciate the great difficulty of absorbing larger proportions of the urban labor force without a concentrated effort designed to prevent the further widening of urban-rural real earnings differentials.

Perhaps a more interesting and relevant application of equation (18) is to consider the potentially conflicting objectives of a successful program of import substitution and a concomitant reduction of modern sector unemployment rates. Bruton has recently underlined the necessity for productivity to grow if import substituting industries are to pay for themselves in real terms [3]. Consequently, it is extremely important that labor productivity should increase substantially in the modern sector. But, as the above example demonstrates, if the gap between urban and rural real earnings capacity is permitted to

widen further, the likelihood of simultaneously raising labor productivity and lowering urban unemployment rates appears negligible indeed. However, if in the above example the urban-rural income differential were to contract by 20 per cent, equation (18) tells us that labor productivity could expand by an additional 1.3 per cent annually without increasing the urban unemployment rate. Alternatively, labor productivity could expand by, say, an additional 1 per cent per annum with a simultaneous decline in the urban unemployment rate.

Finally, consider the question of agricultural development strategy. Johnston has strongly emphasized the point that if the agricultural sector is to make its most meaningful contribution to economic development, it must not only improve labor productivity but also expand employment opportunities [14] [15]. The main point is that premature mechanization of agriculture through the adoption of the most modern techniques of large-scale farming poses serious problems for rural labor absorption. In terms of our model, Johnston's argument would indicate a lowering of the expected rural wage through the introduction of a probability variable similar to that in the urban sector and *ceteris paribus* a consequent rise in rural-urban labor migration. The implication here is that if employment creation is high on the priority list of developing countries, not only should the real wage differential be prohibited from increasing through some appropriate incomes policy but also output and productivity growth in agriculture wherever feasible must be achieved through more efficient use of existing capital resources and not through capital-labor substitution.¹³

¹³ Numerous other important issues of development policy as they relate to the urban unemployment problem take on a new and often surprising aspect when

¹² For some cross-sectional statistical evidence of the positive correlation between rates of output growth and rates of labor productivity growth in the manufacturing sectors of less developed nations (and hence the employment lag), see United Nations [30, p. 96-98]. The principal explanations offered for the observed rapid increases in labor productivity include the following: a greater substitution of capital for labor than is warranted by shadow prices of labor and capital [22, pp. 55-68], improved managerial and organizational capabilities [25, p. 33], and an upgrading of labor efficiency through on the job training programs and the emergence of a more stable, proletarian urban labor force [7].

V. *Some Concluding Comments and Implications of the Analysis*

We have attempted in this paper to formulate a model that is both descriptive and analytical with respect to the mechanism through which economic variables influence urban labor markets in less developed countries. The analysis has tried to come to grips in a simple but rigorous fashion with the fundamental factors affecting urban unemployment and underemployment. Although the model has made some simplifying assumptions especially with respect to the constancy of γ and α , the overall net impact of allowing these parameters to vary over time and/or choosing alternative values is demonstrated, in our opinion, quite conveniently in the model. Moreover, it underlines in a simple and plausible way the interdependent effects of industrial expansion, productivity growth, and the differential expected real earnings capacity of urban versus rural activities on the size and rate of increase in labor migration and, therefore, ultimately on the occupational distribution of the urban labor force.

Perhaps the most significant policy implication emerging from the model is the great difficulty of substantially reducing the size of the urban traditional sector without a concentrated effort at making rural life more attractive. For example,

analyzed within the framework put forth in this paper. For example, in a forthcoming paper which incorporates our basic migration model into a more general two-sector model of economic development, it is demonstrated that under certain (entirely plausible) conditions the economist's standard theoretical policy prescription of generating urban employment opportunities through the use of "shadow prices" implemented by means of wage subsidies or direct government hiring might in fact exacerbate the problem of urban unemployment [11]. Also, the pricing policies of agricultural marketing boards and the burden of rural taxation are revealed as important factors influencing the magnitude of urban unemployment while standard formulas for investment criteria are shown to be biased against agricultural investment projects.

instead of allocating scarce capital funds to urban low cost housing projects which would effectively raise urban real incomes and might therefore lead to a worsening of the housing problem, governments in less developed countries might do better if they devoted these funds to the improvement of rural amenities. In effect, the net benefit of bringing "city lights" to the countryside might greatly exceed whatever net benefit might be derived from luring more peasants to the city by increasing the attractiveness of urban living conditions. Like Marshall's famous scissors analogy, the equilibrium level of nonparticipation in the urban economy is as much a function of rural "supply push" as it is one of urban "demand pull." Thus, as long as the urban-rural real income differential continues to rise sufficiently fast to offset any sustained increase in the rate of job creation, then even in spite of the long-run stabilizing effect of a lower probability of successfully finding modern sector employment, the lure of relatively higher permanent incomes will continue to attract a steady stream of rural migrants into the ever more congested urban slums. The potential social, political, and economic ramifications of this growing mass of urban unemployed should not be taken lightly.

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