# Migration

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Abstract and Keywords

Begins with a discussion of why industrialization is usually accompanied by the concentration of industries in urban areas. It then introduces the Harris–Todaro model, which has been the dominant model of migration in the subject of economic development. In this model, a relatively high, exogenously fixed manufacturing wage pulls rural workers to the urban formal sector, migration ceasing only when the urban informal sector is large enough to equalize the rural wage with the expected urban wage. A subsequent model uses the fact of asymmetric information between employers and employees that leads to adverse selection to make the high manufacturing wage endogenous. The concluding model incorporates forward-looking behaviour, selection, job search in the city, and the role of immigrant worker network in this search.

*Keywords:* adverse selection, asymmetric information, economic development, formal sector, Harris–Todaro model, immigrant network, industrialization, informal sector, job search, migration

Development involves the transformation of the spatial organization of a society. From a dispersed, rural, mostly agrarian, society, a nation in the process of development becomes a more concentrated urban and industrial economy. A fundamental part of this transformation is the movement of a large number of individuals via migration from the rural areas to the cities. The pace of urban growth in many poor countries is extremely rapid: many cities in Africa are growing at more than 7 per cent per year, while several of the giant cities of Asia and Latin America are growing at more than 5 per cent per year.

The driving force behind this transformation is the different technical requirements of agricultural and industrial production. Most obviously, agricultural production is land-intensive, thus requiring a labour force dispersed over a large area, while industrial production requires relatively little land; it is possible, therefore, for the industrial labour force to be concentrated. The possibility of concentration, however, does not provide a sufficient explanation for the emergence of large cities as industrial production expands in the course of development. Why is it that industrial production tends to become concentrated in a few small areas, rather than being dispersed throughout the nation?

One important set of explanations relies on preferences. There may be consumption externalities associated with city life. Individuals might prefer living near many other people, and this positive externality might outweigh the familiar negative congestion externalities associated with population concentration. Given the opportunity to concentrate afforded by the minimal land requirements of industrial production, therefore, cities form.

Economists have tended to focus on the possibility that externalities in production underlie the impetus for population to agglomerate into large urban centres. Marshall (1920) provides the classic account. The concentration of manufacturing firms offers: (1) a pool of skilled industrial workers, and thus lower search costs associated with changes in employment; (2) the possibility of benefiting from positive externalities generated by the production of nontraded goods by neighbouring firms; and (3) the information externality generated by **(p.50)** being able to observe neighbouring firms' technological choices. (See chapter 12 for a full discussion of this last externality.) To these, Krugman (1991) (relying on Pred 1966 and Meyer 1983) adds a fourth: industrial production is characterized by increasing returns to scale. This implies that production of manufactures will occur at only a limited number of sites. To minimize transportation costs, production should be located near major markets. Since industrial workers can generate demand for manufacturing output, it is possible that cities can begin to form: manufacturing concentrates in the city to take advantage of the large urban market, and the large market is brought into existence by the large, localized industrial labour force. The process is limited by the strength of increasing returns in industry and by the magnitude of transportation costs. Less strong increasing returns and higher transportation costs imply more dispersed industrial production. But with strongly increasing returns and relatively low transportation costs, industrial production can fully concentrate in large cities, and the 'bright lights' of the large cities (cheaply available consumer goods) can attract a large urban population.

I

Central to this process of urbanization and industrialization is the mass movement of population from the rural areas to the cities. A model of migration, therefore, is required for an understanding of this structural transformation. Few models have been as dominant in their subject area within development economics as that of migration introduced by Todaro (1969) and Harris and Todaro (1970) (HT). The HT model combines simple and uncontroversial assumptions about migrant behaviour (potential migrants compare the expected utility of migrating with the expected utility of remaining in the countryside) with assumptions regarding the structure of urban and rural labour markets which accord well with many highly visible features of some developing countries. The key institutional assumptions of the model include the following:

1. The rural labour market is competitive.
2. Modern firms hire labour in the city, and the wage they pay is fixed above the market-clearing level, either by restrictive union activity or by governmental policy on wages.
3. Only urban residents can apply for jobs in modern firms, and if modern firms are faced with more applicants than they have jobs, jobs are allocated by lottery.
4. There is an 'informal sector' in which urban residents not otherwise employed can eke out a subsistence living using their labour power alone.

 **(p.51)**  In a moment we will examine the implications of combining these institutional assumptions with the behavioural assumption that potential migrants move to the sector in which their expected utility is highest. First, however, let us briefly consider the empirical foundation of these institutional assumptions.

The most controversial of the institutional assumptions is that regarding the informal sector. In the HT formulation, this sector is viewed as an unproductive holding ground in which workers denied access to the modern industrial sector (merely) survive until they are lucky enough to find a job. This conception of the informal sector is clearly inadequate. In many poor countries there is a large urban population engaged in an extremely diverse set of activities outside the direct scrutiny of the state, and not covered by labour unions. One important literature views this sector as the domain of small-scale entrepreneurs who choose to remain outside the regulatory reach of the state.[1] It is not well established that the wages of comparably skilled individuals in this sector are significantly different from those in the formal sector. Certainly the productivity of individuals in the informal sector is not zero (as we shall assume below).

Second, the evidence on wage rigidity in the urban formal sector is mixed. The conventional view of the source of the rigidity is labour union activism in this sector, or, alternatively, binding minimum wage legislation. While it is correct

that most developing countries have minimum wages, that these are more likely to apply to (or to be enforced in) the urban formal sector, and that unions are much more powerful in this sector, the quantitative importance of these institutions in wage determination is only poorly documented (see Williamson 1988). In Section II we present a simple model which addresses this concern, modifying the HT model by endogenizing the wage in the urban formal sector, but retaining many of the features of HT as a consequence of information imperfections.

Finally, the migration decision is surely more complex than the HT scheme. Migrants do not lose all contact with the rural sector when they move to the city. Many authors have documented the importance of ongoing economic interactions between migrants and their communities of origin.[2] One important consequence is that the geographical dispersion of family members can be seen, at least in part, as one component of a strategy for dealing with spatially correlated risk (Paulson 1993). By spreading individuals (who remain economically linked either through altruism or via implicit risk-sharing contracts) across different agroclimatic zones or different economic sectors, families can diversify their incomes and protect themselves against risks that cannot be insured locally (see Chapter 8). Nor do migrants simply move to a city to join an **(p.52)** undifferentiated mass of migrants. Migrants use connections based at least in part on social networks formed in their communities of origin to improve their prospects of obtaining formal-sector employment and to smooth their transition into the city. In Section III we look more closely at the migration process than is possible in the simple HT model.

With these caveats in mind, the HT model remains a simple and powerful model of some aspects of structural transformation in at least some poor countries. Let $L_r$ be the rural population, which is employed in agriculture on a fixed amount of land. Agricultural output is determined by the production function $g(L_r)$, and is sold on a world market at a price normalized to unity. (The small open economy assumption is made to abstract from changes in the relative prices of food and manufactures as the structure of the economy changes.) The rural labour market is competitive, so rural wages are

$$w_r = g'(L_r),$$

(1)

as shown in Figure 5.1. The urban population is either employed in manufacturing ($L_m$) or is unemployed (working in the informal sector) ($L_u$). Normalize the population to 1, so that $L_r + L_m + L_u = 1$. The urban unemployed live by their wits in this model, scratching out a subsistence existence by engaging in petty trade, craft production, or urban agriculture. We normalize their wage to zero. $w_m$ is the institutionally fixed manufacturing wage. Thus, manufacturing employment $L_m$ is implicitly defined as a function of this fixed wage to satisfy
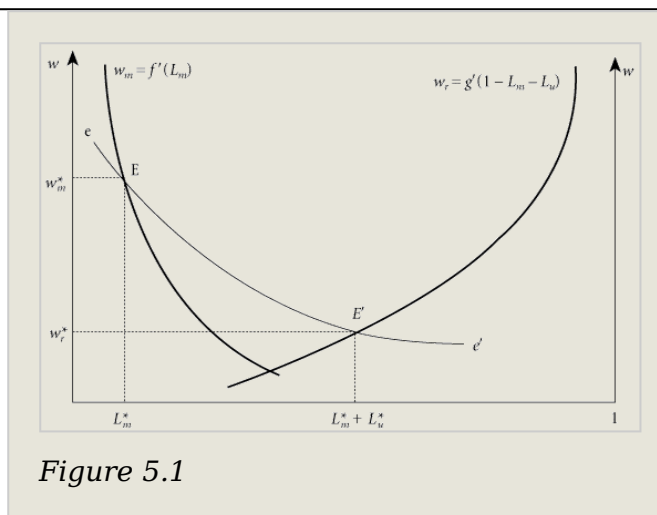
Figure 5.1

$$w_m = f'(L_m).$$

(2)

Equation (2) defines the manufacturing demand for labour $L_m(w_m)$, which is drawn in Figure 5.1. Only urban residents can apply for manufacturing employment, and the probability of employment is simply the number of jobs divided by the number of urban residents. The expected wage of an urban resident, therefore, is $[L_m/(L_m + L_u)]w_m$—i.e. the probability of finding a job times the urban wage.

Migration occurs to equalize the expected wage of an urban resident with the wage that the resident could earn in the rural areas:

$$w_r = \frac{L_m(w_m)}{L_u + L_m(w_m)} w_m.$$

(3)

Equation (3) defines the size of the urban informal sector as a function of the urban wage. Migration takes place until the size of the urban informal sector is large enough (and the rural population small enough) to equalize the rural wage with the expected wage earned in the city. The equilibrium is depicted in Figure 5.1, which is based on Corden and Findlay (1975). The exogenously fixed manufacturing wage $w_m^*$ determines manufacturing employment $L_m^*$.

Rewriting equation (3), we see that equilibrium requires that $w_r(L_u + L_m) = w_m L_m$. The curve $ee'$ is the locus of points such that the wage times the amount of labour is equal to $w_m^* L_m^*$ (it's a rectangular hyperbola). At points $E$ and $E'$ there is an urban informal sector of size $L_u^*$, a rural population of $1 - L_m^* - L_u^*$, and thus a rural wage of $w_r^*$. Because $E$ and $E'$ are on ee$'$, $w_r^*(L_u^* + L_m^*) = w_m^* L_m^*$ and expected wages are equalized in the urban and rural sectors.

The urban informal sector characterized by very low living standards serves to equilibrate the migration process. If the exogenously fixed manufacturing wage $w_m$ is high, then the proportion of population employed in the manufacturing sector is relatively small. If there were no urban informal sector ($L_u = 0$), the remainder of the population ($1 - L_m$) would be employed in agriculture. The

marginal product of labour in agriculture and hence the rural wage would be very low. At the same time, the probability of employment $L_m/(L_u + L_m)$ would be one, and hence the expected urban wage would be high. Labour market equilibrium is achieved through migration, as people move out of agriculture (raising the rural wage) and into the city. This creates a pool of unemployed workers which makes up the urban informal sector, lowers the probability of finding a job in the city, and thus lowers the expected urban wage.

Migration slows to a halt with rural wages still a fraction $[L_m/(L_u + L_m)]$ of the wages earned by manufacturing employees. Thus, the model is consistent with a persistent gap in living standards between rural residents and those employed in the urban formal sector.

**(p.54)** II

In some economies, it is not plausible that the manufacturing wage is fixed exogenously, either by government regulation or by the political strength of unions. In these circumstances, is the HT model irrelevant? It has been argued that (relatively) high manufacturing wages and an urban informal sector can emerge endogenously as a consequence of information asymmetries between employers and employees. Here we present a simple model of adverse selection which maintains much of the flavour of the HT model without assuming an exogenously set manufacturing wage. (We follow Bencivenga and Smith 1997, who use a similar model as the foundation of their study of the dynamics of migration in a growing economy. See Esfahani and Salehi-Isfahani (1989) for a model in which moral hazard gives rise to a similar equilibrium.)

As in the basic HT model, we assume that agents choose to locate in the rural or urban sector on the basis of expected income. Suppose that there are two types of agent, indexed by $i = 1, 2$. Individuals know their own type, but this is not known by anyone else. In the rural areas, production takes place using only labour, and agents work as independent producers. The fact that agents do not know each other's types, therefore, is of no consequence in this sector. An agent of type $i$ can produce $\pi_i$ in agriculture, with $\pi_2 > \pi_1 > 0$. We maintain the small open economy assumption, so the relative price of agricultural and manufactured products is fixed (at unity).

In the city, firms produce using the technology $f(L)$, where $L$ is the number of type 2 workers employed. Type 1 workers do not contribute to industrial output. The same good can also be produced by effort alone in the city. (This is the 'informal sector'.) A type $i$ worker can produce $\beta_i$ units of the good, with $\beta_2 > \beta_1 = 0$.

We are going to describe an equilibrium in which type 1 agents remain in the countryside, and some type 2 agents come to work in the city. There is a problem of adverse selection—type 2 agents are more productive in firms than type 1 agents, but firms cannot distinguish between them *a priori*. We will see that this

adverse selection problem leads to a labour market equilibrium and migration process quite similar to that discussed by HT.

Let $u$ be the fraction of the urban population that is unemployed (employed in the informal sector). In keeping with the assumption of the HT model, $(1 - u)$ will be the probability of any city resident being employed in manufacturing. In order for the type 1 agents to choose to remain in the rural area, it must be the case that

$$\pi_1 \geq (1-u)w_m,$$

(4)

where $w_m$ is the manufacturing wage. The left-hand side of (4) is the rural income of type 1 agents, and the right-hand side is their expected income in the **(p.55)** city. If some, but not all, type 2 agents choose to move to the city, then their expected income must be the same in the two locations:

$$\pi_2 = (1-u)w_m + u\beta_2.$$

(5)

Each manufacturing firm offers a wage ($w_m$) and a probability of employment $(1-u)$ with the offers of other firms taken as given, and then hires labour to maximize profits. The expected urban incomes of type 1 and 2 agents satisfy the single crossing property; hence (4) will be binding in any Nash equilibrium. To see this, note that

$$0\left.\frac{\mathrm{dw}_m}{\mathrm{du}}\right|_{\text{type 1 income constant}} = \frac{w}{1-u} > \frac{w-\beta}{1-u} = 0\left.\frac{\mathrm{dw}_m}{\mathrm{du}}\right|_{\text{type 2 income constant}}$$

Suppose that other firms offer a wage and probability of employment such that (4) is not binding. Any single firm could then offer a lower wage and lower probability of employment such that (5) remains true and (4) remains a strict inequality. This firm would still attract no type 1 workers (because these workers prefer to stay in the rural sector), would remain acceptable to type 2 workers (because (5) is satisfied), but would achieve higher profit. Therefore (4) is binding in any equilibrium.
Solving (4) and (5), we find

$$u^* = \frac{\pi_2 - \pi_1}{\beta_2},$$

(6)
and

$$w_m^* = \frac{\beta_2 \pi_1}{\beta_2 - (\pi_2 - \pi_1)}.$$

(7)

The migration equilibrium looks much the same as with the conventional HT model. The manufacturing wage is higher than the rural wage ($w_m^* > \pi_2 > \pi_1$), but the existence of a pool of unemployed (or, more properly, *under*employed) workers in the urban informal sector serves to equalize urban and rural

expected wages. (Equations (4) and (5) both hold with equality.) The overall size of the urban population is determined by manufacturing demand. Manufacturers hire labour until $f'(L) = w_m^*$. If the marginal product of manufacturing labour increases (perhaps because of an increase in the quantity of manufacturing capital), the number of manufacturing workers and the number of workers in the informal sector increase in equal proportion.

**(p.56)** III

The models we have examined thus far contain strikingly simple accounts of the migration process. Among the more important aspects of migration that are ignored are the search for employment in the city by migrants, the fact that the migration decision is forward-looking, and the selectivity of the migration process. A simple model based on Carrington *et al.* (1996) enables us to examine these three attributes of the migration process.

First, migration involves forward-looking behaviour: people make locational decisions based on their expectations regarding their future prospects in the city and the countryside. Second, migration involves selection. Not everyone simultaneously finds it optimal to move to the city. Most dramatically, young adults and the well educated are heavily over-represented among migrants moving from rural areas to the city. For these individuals, the discounted expected wage differential between the city and the village is particularly high, and it is likely that the same individuals find the moving process less costly. It is this last difference that is modelled by Carrington *et al.*

Finally, migration involves a search for employment. Crucially, both the cost of moving and the difficulty of finding employment in the new location can be mitigated by the presence in the city of previous migrants. These migrants are a vital source of information about housing and job prospects for potential migrants in their communities of origin. They also provide a social environment in the city which eases the transition to a new kind of living for those newly arrived from the countryside. Finally, communities of established migrants in the city often provide introductions to potential employers, land-lords, and creditors. Migrants to a city often concentrate within specific areas where they can best take advantage of this support.

Suppose that individuals can choose to live either in the city or in the countryside. Normalize the time zero population in each area to be 1. $M_t$ is the number of (originally) rural workers who live in the city at time $t$, so the rural population at $t$ is $1 - M_t$. Let $\pi_t$ be the profit per worker from agricultural production time $t$, which depends on the rural population:

$$\pi_t = \gamma^r(M_t).$$

(8)

Let $E_t$ be the number of the migrants who are employed in industry at time $t$ ($E_t \leq M_t$, because migrants need to search for employment), and $w_t$ be the industrial wage. The inverse labour demand function in manufacturing is

$$w_t = \gamma^m(E_t).$$

(9)

$\gamma^r$ is increasing in $M_t$ and $\gamma^m$ is decreasing in $E_t$, and $\gamma^m(0) > \gamma^r(0)$, so that the manufacturing wage is higher than the rural wage before any migration occurs. **(p. 57)** Migration from the rural area to the city at time $t$ involves a cost of $c(M_{t-1}, h)$. Thus, the cost of moving depends upon the presence in the city of previous migrants and on $h$, a measure of the personal characteristics (for example the age or education) of the potential migrant. We assume that $\partial c/\partial M < 0$ and $\partial c/\partial h > 0$. (For simplicity, we will also assume that $\partial^2 c/\partial M \partial h = 0$.) Let $F(h)$ be a measure of (originally) rural workers of type less than or equal to $h$. We assume that workers live for ever, and that they choose their location to maximize the expected discounted value of income (net of migration cost).

A move to the city does not guarantee employment. New migrants have to search for jobs, and they are helped in this search by the presence in the city of former migrants who are themselves employed. Let $p(E_{t-1})$ be the probability of a migrant to the city finding employment at time $t$. The externality through which previously employed migrants help currently unemployed migrants find jobs is reflected in the assumption that $p'(\cdot) > 0$. (We also assume that $p(0) > 0$.) For simplicity, we assume that anyone born in the city or who has ever found a job in the city is employed with certainty.

Let $V^m(M_t, E_{t-1}, h, u)$ be the expected discounted value of future income for a (previously rural) worker of type $h$ who is unemployed in the city at time $t$. $V^m(M_t, E_{t-1}, h, e)$ is the similar value for an employed worker, and $V^r(M_t, E_{t-1}, h)$ is the value of staying in the rural area at time $t$. It can be shown (Carrington *et al.* 1996: lemma 1) that there will never be reverse migration from the city to the countryside.[3] Without reverse migration, the future expected income of individuals in the city does not depend on their type ($h$), because $h$ affects only the cost of moving to the city. Thus, the expected discounted income of an unemployed migrant to the city with discount rate $s$ is (we take the wage to be zero if a manufacturing job is not found)

$$V^m(M_t, E_{t-1}, u) = p(E_{t-1}) V^m(M_t, E_{t-1}, e) + \delta[1 - p(E_{t-1})] V^m(M_{t+1}, E_t, u).$$

(10)

The expected income of an employed urban resident is

$$V^m(M_t, E_{t-1}, e) = \gamma^m(E_t) + \delta V^m(M_{t+1}, E_t, e),$$

(11)

while the expected income of someone remaining in the countryside is

$$V^r(M_t, E_{t-1}, h) = \gamma^r(M_t) + \delta \mathrm{Max}\{V^m(M_{t+1}, E_t, h, u) - c(M_t, h), V^r(M_{t+1}, E_t, h)\}.$$

(12)

Now consider the migration decision of someone of type $h$ currently living in a rural area. She will move to the city if **(p.58)**

$$V^m(M_t, E_{t-1}, u) \geq V^r(M_t, E_{t-1}, h,) + c(M_{t-1}, h).$$

(13)

The right-hand side of (13) is strictly increasing in $h$, so if type $h$ prefers to migrate at time $t$, so do all types $h' \leq h$. As migration proceeds and the stock of migrants increases, the cost of migrating falls. At the same time, the number of employed migrants increases, and with that the probability of a new migrant locating a job also increases. For both reasons, rural residents of increasingly higher type find it profitable to migrate. The process finally halts when the wage gap has diminished sufficiently that there are no further incentives to move. In this steady-state, $M_t = M_{t+1} = M$, so that there is no further migration. All who have migrated find employment (as $t \to \infty$), so that $M = E$. Let $H \equiv F^{-1}(M)$ be the marginal type of rural worker, just indifferent between locating in the city and staying in the rural area at the steady state. In the steady state, there must be no incentive for urban workers to move back to the countryside, so

$$V^m(M, M, e) = \gamma^m(M)/(1 - \delta) \geq V^r(M, M, h) \forall h \leq H,$$

(14)

and there must be no incentive for those in the rural areas to move to the city:

$$V^r(M, M, h) \geq V^m(M, M, u) - c(M, h) = \frac{p(M)V^m(M, M, e)}{1 - \delta(1 - p(M))} - c(M, h) \forall h \geq H.$$

(15)

The steady-state equilibrium level of migration satisfies (15) with equality for the marginal $H$. Thus, $V^r(M, M, h) = \gamma^r(M)/(1 - \delta)$ (from (12)). Recalling that $V^m(M, M, e) = \gamma^m(M)/(1 - \delta)$ and substituting into (15) with $h = H$, we see

$$\frac{\gamma^m(M) - \gamma^r(M)}{1 - \delta} = c(M, H) + \frac{\gamma^m(M)(1 - p(M))}{1 - \delta(1 - p(M))}.$$

(16)

For the marginal rural potential migrant in the steady-state equilibrium, the present discounted value of the urban–rural wage gap is just equal to the cost of migrating ($c$), plus the expected present value of the lost income during her period searching for a job in the city.

This enriched model contains interesting implications for the migration process. Early migrants generate an externality by easing the transition of later migrants from their low productivity rural employment to higher-productivity industrial work. In this model this benefit comes in two distinct forms: reducing the moving costs associated with migration, and reducing the expected loss of income resulting from job search. In reality, of course, these two effects are intertwined—migrant communities that are more densely interconnected are likely to be more effective, both in providing employment to new migrants and in supporting them in their adjustment to new living conditions in the city. Migrants from particular rural origin communities congregate in particular **(p.**

**59)** cities, and even in particular neighbourhoods of cities, in order to capture as fully as possible the benefits provided by earlier migrants.

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Notes:

(1) See Maloney (1996) for evidence that the informal sector in Mexico is better characterized in this manner. Hart (1973) is an important early statement of this point of view.

(2) See e.g. Lucas and Stark (1985), Katz and Stark (1986), Rosenzweig (1988), Rosenzweig and Stark (1989).

(3) The cost of migrating to the city ensures that there will be no overshooting, provided that expected wages for new migrants are increasing in $E_t$. An increase in $E_t$ increases the probability of new migrants finding a job, but decreases the wage (through (8)). As long as the former effect is stronger, there can never be reverse migration back to the countryside.

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