Lecture 12
Topics in Development Economics: Migration

Nurgul Tilenbaeva

American University - Central Asia

26.04.2023

Contents

- Introduction
- The Harris-Todaro Model
- Model of Adverse Selection
- Model of Carrington et al. (1996)

Introduction

- Development involves the transformation of the spatial organization of a society.
  Dispersed, rural, mostly agrarian society $\Rightarrow$ Concentrated urban and industrial economy.
  - Movement of a large number of individuals via migration from the rural areas to the cities.
    Example: Many cities in Africa are growing at more than 7% per year;
    Example: Several of the giant cities of Asia and Latin America are growing at more than 5 % per year.

Introduction

Why is it that industrial production tends to become concentrated in a few small areas, rather than being dispersed throughout the nation?

Introduction

1. Different technical requirements of agricultural and industrial production.
   - Agricultural production is land-intensive.
     ⇒ Labour force dispersed over a large area.
   - Industrial production requires relatively little land.
     ⇒ It is possible for the labour force to be concentrated.
2. Preferences.
   - Consumption externalities associated with city life.
     - Individuals might prefer living near many other people.
   - Production externalities.
     The concentration of manufacturing firms offers (Marshall (1920)):
     1. a pool of skilled industrial workers
        ⇒ lower search costs associated with changes in employment.
     2. the possibility of benefiting from positive externalities generated by the production of nontraded goods by neighboring firms.
     3. the information externality generated by being able to observe neighboring firms' technological choices.
     4. industrial production is characterized by increasing returns to scale (Krugman 1991).

The Harris-Todaro Model

The key institutional assumptions of the model:

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:
   - restrictive union activity;
   - 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 <u>informal sector</u> in which urban residents not otherwise employed survive and live on subsistence living using their labour power alone.

The Harris-Todaro Model

The most controversial assumptions:

2. The evidence on wage rigidity in the urban formal sector is mixed.
   - The quantitative importance of restrictive union activity and minimum wages is poorly documented (Williamson 1988).

4. An <u>informal sector</u> 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.
   - 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.

The Harris-Todaro Model

Let

- L_r: the rural population, which is employed in agriculture on a fixed amount of land.
- $g(L_r)$: the production function, which determines agricultural output, which is sold on a world market at a price normalized to unity.

The rural labour market is competitive, so rural wages are

$$w_r = g'(L_r) \tag{1}$$

The Harris-Todaro Model

The urban population is either

- employed in manufacturing (L_m)
  or

- unemployed (working in the informal sector) (L_u).

Normalize the population to 1, so that

$$L_r + L_m + L_u = 1$$

Normalize the wage in the informal sector to zero.

- w_m: the institutionally fixed manufacturing wage.

Manufacturing employment L_m is implicitly defined as a function of this fixed wage to satisfy

$$w_m = f'(L_m) \tag{2}$$

The Harris-Todaro Model

- Only urban residents can apply for manufacturing employment, and the probability of employment is the number of jobs divided by the number of urban residents.

- The expected wage of an urban resident is

$$\frac{L_m}{L_m + L_u} w_m$$

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

$$w_r = \frac{L_m(w_m)}{L_u + L_m(w_m)} w_m \qquad (3)$$

- 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.
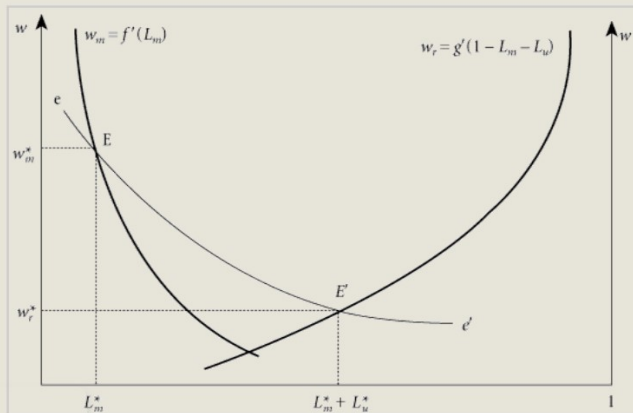
The Harris-Todaro Model

Figure 5.1

The Harris-Todaro Model

- The exogenously fixed manufacturing wage w_m^* determines manufacturing employment L_m^*.
- 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 $w_m^* L_m^*$.
- At points E and E' there is:
  - an urban informal sector of size L_u^*;
  - a rural population of $1 - L_m^* - L_u^*$;
  - a rural wage of w_r^*.
- Because E and E' are on ee',

$$w_r^*(L_u^* + L_m^*) = w_m^* L_m^*$$

- Expected wages are equalized in the urban and rural sectors.

The Harris-Todaro Model

- In some economies, it is not plausible that the manufacturing wage is fixed exogenously, either by
  - government regulation
    or
  - political strength of unions.

  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.

Model of Adverse Selection

- Agents choose to locate in the rural or urban sector on the basis of expected income.
- There are two types of agents, 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.
- An agent of type i can produce π_i in agriculture, with

$$\pi_2 > \pi_1 > 0$$

- The relative price of agricultural and manufactured products is fixed at unity.

Model of Adverse Selection

- 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.
- A type i worker can produce β_i units of the good, with $\beta_2 > \beta_1 = 0$
- 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*.

Model of Adverse Selection

- Let u be the fraction of the urban population that is unemployed (employed in the informal sector).
- $(1 - u)$ 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

$$\pi_1 \geq (1 - u)w_m \tag{4}$$

where

w_m: the manufacturing wage.

- 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:

$$\pi_2 = (1 - u)w_m + u\beta_2 \tag{5}$$

Model of Adverse Selection

- Solving (4) and (5), we find

$$u^* = \frac{\pi_2 - \pi_1}{\beta_2} \qquad (6)$$

and

$$w_m^* = \frac{\beta_2 \pi_1}{\beta_2 - (\pi_2 - \pi_1)} \qquad (7)$$

Model of Adverse Selection

- 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 underemployed in the urban informal sector serves to equalize urban and rural expected wages.
  - 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, the number of manufacturing workers and the number of workers in the informal sector increase in equal proportion.

Model of Carrington et al. (1996)

- The Harris-Todaro model and the model of adverse selection ignore three aspects of migration:
  1. search for employment in the city by migrants;
  2. the fact that the migration decision is forward-looking;
  3. the selectivity of the migration process.

- The model based on Carrington et al. (1996) enables us to examine these 3 attributes of the migration process.

Model of Carrington et al. (1996)

1. Migration involves forward-looking behaviour:
   - People make locational decisions based on their expectations regarding their future prospects in the city and the countryside.
2. Migration involves selection.
   - Not everyone simultaneously finds it optimal to move to the city.
   - Young adults and the well educated are heavily over-represented among migrants moving from rural areas to the city.
3. Migration involves a search for employment.
   - 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.

Model of Carrington et al. (1996)

- Suppose that individuals can choose to live 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.
- The rural population at t is $1 - M_t$.
- Let π_t be the profit per worker from agricultural production time t, which depends on the rural population:

$$\pi_t = \gamma^r(M_t) \tag{8}$$

Model of Carrington et al. (1996)

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

$$w_t = \gamma^m(E_t) \tag{9}$$

- γ^r is increasing in M_t;
- γ^m is decreasing in E_t;
- $\gamma^m(0) > \gamma^r(0)$

Model of Carrington et al. (1996)

- Migration from the rural area to the city at time t involves a cost of $c(M_{t-1}, h)$.
  - h is a measure of the personal characteristics of the potential migrant (age or education).
  - We assume that
    - $\frac{\partial c}{\partial M} < 0$;
    - $\frac{\partial c}{\partial h} > 0$
- $F(h)$ is a measure of (originally) rural workers of type less than or equal to h.
- We assume that
  - workers live forever;
  - they choose their location to maximize the expected discounted value of income (net of migration cost).

Model of Carrington et al. (1996)

- Let $p(E_{t-1})$ be the probability of a migrant to the city finding employment at time t.
- 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.
- $V^r(M_t, E_{t-1}, h)$ is the value of staying in the rural area at time t.
- It can be shown that there will never be reverse migration from the city to the countryside.
- 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.

Model of Carrington et al. (1996)

- The expected discounted income of an unemployed migrant to the city with discount rates is

$$V^m(M_t, E_{t-1}, u) = p(E_{t-1})V^m(M_t, E_{t-1}, e) + \\ \delta[1 - p(E_{t-1})]V^m(M_{t+1}, E_t, u) \quad (10)$$

- The expected income of an employed urban resident is

$$V^m(M_t, E_{t-1}, e) = \gamma^m(E_t) + \delta V^m(M_{t+1}, E_t, e) \quad (11)$$

- The expected income of someone remaining in the countryside is

$$V^r(M_t, E_{t-1}, h) = \gamma^r(M_t) + \delta Max\{V^m(M_{t+1}, E_t, h, u) \\ - c(M_t, h), V^r(M_{t+1}, E_t, h)\} \quad (12)$$

Model of Carrington et al. (1996)

- Now consider the migration decision of someone of type h currently living in a rural area. She will move to the city if

$$V^m(M_t, E_{t-1}, u) \geq V^r(M_t, E_{t-1}, h) + c(M_{t-1}, h) \qquad (13)$$

- As migration proceeds and the stock of migrants increases, the cost of migration falls.

- 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.

Model of Carrington et al. (1996)

- In this steady state, $M_t = M_{t+1} = M$, so that there is no further migration.
- All who have migrated find employment, 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

$$V^m(M, M, e) = \gamma(M)/(1 - \delta) \geq V^r(M, M, h) \forall h \leq H \qquad (14)$$

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

$$V^r(M, M, h) \geq V^m(M, M, u) - c(M, h) =$$
$$\frac{p(M)V^m(M, M, e)}{1 - \delta(1 - p(M))} - c(M, h) \forall h \geq H \qquad (15)$$

Model of Carrington et al. (1996)

- Then,

$$\frac{\gamma^m(M) - \gamma^r(M)}{1 - \delta} = c(M, H) + \frac{\gamma^m(M)(1 - p(M))}{1 - \delta(1 - p(M))} \qquad (16)$$

Model of Carrington et al. (1996)

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.
  - This benefit comes in two distinct forms:
    1. Reducing the moving costs associated with migration;
    2. Reducing the expected loss of income resulting from job search.

References

- Bardhan, P., & Udry, C. (1999). Chapter 5. Development Microeconomics. Oxford University Press. https://doi.org/10.1093/0198773 714.001.0001