Education, unemployment and migration

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1. Introduction

Topic: Interaction of education, migration and unemployment in interregional context

Questions:

- Consequences of free migration between regions for educational decisions, wage levels, and unemployment in sending and receiving region?
- How do regional and national economic shocks affect educational decisions and interregional migration?
- Can active labor market policies be rationalized?

Stylized facts:

- Persistent high interregional wage differentials
- Low-wage regions with high unemployment rates
- Higher formal qualification with reduced unemployment risk
- Propensity to migrate stronger for high-skilled than for low-skilled
Model:
- Unemployment according to efficiency wage argument
- Migration and education endogenous; distribution of costs of human capital acquisition and migration across individuals
- Exogenous technological gap between regions
- Presence of unemployment distorts decisions of individuals: incentives to acquire human capital and to migrate to rich region too strong, as measured by productivity differentials; but: only general equilibrium externalities
- Unemployment benefits reduce incentive for education and migration

=> education subsidy and mobility premium
2. The model

Two regions: high-wage region $A$, low-wage region $B$
Two skill groups: low-skilled (type $L$), high-skilled (type $H$)

$w^k_i$: wage of worker of type $k$ in region $i$
$c \in [0, \bar{c}]$: cost of acquiring human capital
$d \in [0, \bar{d}]$: cost of migration to other region

$c$ and $d$ statistically independent
$N_i$: total initial number of individuals in region $i$

One-period framework

$p^k_i$: unemployment probability of individual of skill type $k$ living in region $i$

$\theta_i := p^H_i$: unemployment rate of skilled workers
$\psi_i := p^L_i$: unemployment rate of unskilled workers

$\bar{w}$: uniform unemployment benefit
$e$: effort expected at workplace, same for skilled and unskilled
• Value of living in region $j$ as individual of type $k$:

$$V_{j}^{k} = [(1 - p_{j}^{k}) \left( u(w_{j}^{k}) - e \right) + p_{j}^{k} u(w)]$$

(1)

• Individual of type $k$ migrates from birth region $i$ to other region $j$ if and only if $V_{j}^{k} - V_{i}^{k} > d$

• Individual born in region $i$ invests in education if and only if

$$\max \{ V_{i}^{H}, V_{j}^{H} - d \} - \max \{ V_{i}^{L}, V_{j}^{L} - d \} > c$$

(2)

$U_{i}, S_{i}$: total employment of low-skilled and high-skilled labor in region $i$

$G_{i}(S_{i}, U_{i}) = \beta_{i}G(S_{i}, U_{i})$: production function, with $\beta_{A} > \beta_{B} > 0$, decreasing returns to scale
• Shirking model:

$q$: probability that shirker is caught and fired immediately

$b$: exogenous separation rate

$r$: interest rate

No-shirking condition:

\[ u(w) - e \geq u(\bar{w}) + re + \frac{be}{q} \]  

(3)

• Input rule:

\[ \frac{\partial G_i(S_i, U_i)}{\partial S_i} - w_i^H = 0 \]  

(4)

\[ \frac{\partial G_i(S_i, U_i)}{\partial U_i} - w_i^L = 0 \]  

(5)
Fig. 1. Migration and education thresholds
Lemma 2:

(i) Share of individuals acquiring skills in region B smaller than in region A.

(ii) Of individuals born in region B, share of skilled workers among migrants to region A exceeds share of skilled workers remaining in region B.

(iii) Share of skilled workers among those staying in region B smaller than corresponding share among natives in region A.

(iv) In migration equilibrium: share of skilled workers in region A higher than corresponding share in region B.

- not obvious whether native population of high-wage region less or more skill-intensive than immigrants

- brain drain out of poor region at given education threshold, possible brain gain as education threshold tends to rise
3. Comparative statics

- Perfect substitutes: one unit of skilled labor = $\sigma > 1$ units of unskilled labor
- Impacts of population increase:

**Proposition 1:** Higher initial population in rich or poor region, $N_A$ or $N_B$, induces (i) lower wages, (ii) higher skill-specific unemployment rates and (iii) smaller education thresholds in both regions.
• Impacts of region-specific technological shocks and skill-biased technological change:

**Proposition 2:** (i) *Rising productivity factor in rich or poor region, \( \beta_A \) or \( \beta_B \), increases wage rates and reduces group unemployment rates in both regions.*

(ii) *Rising productivity factor of skilled workers decreases wage and increases unemployment rate of low-skilled in both regions.*
4. Welfare analysis

- Simplified version: linear utility
- Social planner maximizes total output net costs of effort, education, and migration, st no-shirking constraints
- Migration of individual of type $X$ from region $B$ to region $A$ efficient if

\[
(1 - p_A^{X}) u(w_A^{X}) - (1 - p_B^{X}) u(w_B^{X}) - d + \Gamma^X > 0
\]  
with net general equilibrium externality

\[
\Gamma^X = \frac{\partial \theta_B}{\partial X_B} [\sigma u (w_B) - e] H_B + \frac{\partial \psi_B}{\partial X_B} [u(w_B) - e] L_B
\]

\[
- \frac{\partial \theta_A}{\partial X_A} [\sigma u (w_A) - e] H_A - \frac{\partial \psi_A}{\partial X_A} [u(w_A) - e] L_A
\]

aggregate labor supply in $B \downarrow \implies$ wages in $B \uparrow \implies$ group unemployment rates in $B \downarrow$; inverse impacts in $A$
\* Social planner will qualify workers being born in region $A$ for whom

\[(1 - \theta_A) u(w_H^A) - (1 - \psi_A) u(w_L^A) - c + \Gamma_A > 0\] (8)

\* Worker born in region $B$ should acquire human capital if

\[
\max \left\{ (1 - \theta_B) u(w_H^B) - (1 - \psi_B) u(w_L^B) - c + \Gamma_B, \\
(1 - \theta_A) u(w_H^A) - (1 - \psi_B) u(w_L^B) - c - d + \Gamma_B + \Gamma^H \right\} > 0 \] (9)

with

\[
\Gamma_j = - \left\{ \left[ \frac{\partial \theta_j}{\partial H_j} - \frac{\partial \theta_j}{\partial L_j} \right] [\sigma u(w_j) - e] H_j \\
+ \left[ \frac{\partial \psi_j}{\partial H_j} - \frac{\partial \psi_j}{\partial L_j} \right] [u(w_j) - e] L_j \right\} < 0 \] (10)

aggregate labor supply $\uparrow \iff$ wages $\downarrow \iff$ group unemployment rates $\uparrow$
• Unemployment benefit is source of distortion; number of workers who acquire skills and number of migrants too small

**Proposition 3:** Corrective region-specific education subsidy $\sigma_j$ and type-specific migration subsidy $\rho^i$ that achieve perfect internalization are

$$\sigma_j = (\psi_j - \theta_j) u(\bar{w}) + \Gamma_j$$

and

$$\rho^i = (p^i_B - p^i_A) u(\bar{w}) + \Gamma^i.$$

Level of subsidy is always smaller than full education or migration cost of marginal individual.

• Pareto improvement on allocation without subsidies cannot be achieved due to information rents
5. Conclusions

- Some brain drain out of poor region due to higher adjusted wage differentials for skilled
- Regional shocks distributed across all regions
- Overinvestment due to unemployment rate differentials without externalities, underinvestment due to unemployment benefits can be corrected by education and migration subsidies
- Alternative setup: identical cost of education, distribution on success probability
- Investment in physical capital and technological change absent