Allocating Scarce Resources for Poverty Reduction: Rural versus Urban

Ravi Kanbur

www.kanbur.dyson.cornell.edu

World Bank-GWU Conference

May 14, 2013
Outline

• Introduction
• Structural Change and Income Distribution
• The Fixed Population Case
• Complications of Migration
• Conclusion
Introduction (1)

• “Rural Development” Conferences:
  – There is Urban Bias in policy making. Rural Development must remain the priority. Incidence of poverty is higher. Total number of poor is higher. Rural Development will slow urbanization and its problems.

• “Urban Development” Conferences:
  – Too much attention on Rural Development. New focus needed on Urban Development. In some cases depth of urban poverty is greater. Inexorable march of urbanization. Number of urban poor is growing. Better get ready for tomorrow’s poverty.
Introduction (2)

• Question: At the margin, how to prioritize spending of scarce public resources if the objective is national poverty reduction?

• Conceptually, this question can be asked across any set of jurisdictions—provinces, districts, sectors, etc.

• I want to develop a framework in which we can address this question, and show a simple theoretical illustration.
Structural Change and Income Distribution (1)

- Two sectors/jurisdictions A and B, income densities $f_A$ and $f_B$
- Population shares $x_A$ and $x_B$; $x_A + x_B = 1$
- National income density function:
  $$f(y) = x_A f_A + x_B f_B$$
- Change in income distribution
  $$df(y) = x_A df_A + x_B df_B + (f_A - f_B)d x_A$$
Structural Change and Income Distribution (2)

• Thus income distribution change at the national level has two elements: (i) a term showing population weighted sum of within sectoral distribution change and (ii) a term showing the effect of population shift with unchanged sectoral distributions.

• Note: Analogy with McMillan-Rodrik Productivity Change
Structural Change and Income Distribution (3)

• Let $\int_n$ be the $n^{th}$ order incomplete integral. Then:
  
  $\int_n f(y) = \left[ x_A \int_n f_A + x_B \int_n f_B \right]$

  $\quad \quad + \left[ (\int_n f_A - \int_n f_B) d x_A \right]$

• Thus the national change in distribution is $n^{th}$ order dominating if (i) change in each sector is $n^{th}$ order dominating and (ii) the sector towards which population moves $n^{th}$ order dominates the sector from which the population moves.
Structural Change and Income Distribution (4)

• Special case \( df_A = df_B = 0 \); i.e. the only effect is that of population shift between the two sectors. This might be labeled the case of “pure structural change”.


• In this case:

\[
\begin{align*}
\text{d}\int nf(y) = & \left[ (\int nf_A - \int nf_B) \text{d} x_A \right]
\end{align*}
\]
Structural Change and Income Distribution (5)

• But what if $f_A$ and $f_B$ do not stand in a dominance relationship to each other? In particular, what if we only have the “Kuznets stylized facts”—mean and inequality are higher in one sector (urban sector) than in the other (rural).

• Now dominance relationships cannot necessarily be established at the national level but for specific inequality measures the relationship between national mean and national inequality can be established. Under certain conditions this relationship has the “Kuznets inverse-U shape” (Anand-Kanbur, 1993).
Structural Change and Income Distribution (6)

• Special case. $df_A, df_B \neq 0$. BUT instead of dominance, focus on poverty, which combines the effect of mean and inequality.

• FGT Poverty Measure. Poverty line $z$.

• $P_{\alpha} = \int_{z}^{\infty} \frac{(z-y)}{z}^\alpha f(y) \, dy$

• $\alpha = 0, 1, 2$ Degree of “poverty aversion”
  – $\alpha = 0$; Poverty incidence or “Head Count ratio”
  – $\alpha = 1$; Income Gap measure
  – $\alpha = 2$; Squared Gap measure
Structural Change and Income Distribution (7)

• FGT Poverty Measure is Additively Decomposable

• \( P_\alpha = x_A P_{\alpha, A} + x_B P_{\alpha, B} \)

• So, \( P_{\alpha, A} \) is poverty in A while \( x_A P_{\alpha, A} / P_\alpha \) is the fraction of national poverty accounted for by jurisdiction A.
Structural Change and Income Distribution (8)

• Change in national poverty:

\[ dP_\alpha = [x_A dP_{\alpha, A} + x_B dP_{\alpha, B}] + dX_A [P_{\alpha, A} - P_{\alpha, B}] \]

• Thus change in national poverty is composed of two terms: (i) a weighted sum of sectoral changes in poverty and (ii) difference in sectoral poverty times change in population.

• Once again, notice analogy to productivity improvement within a sector and structural reallocation between low and high productivity sectors (McMillan-Rodrik).
Structural Change and Income Distribution (9)

• Thus the effects of public policies, allocating scarce resources for “rural development” or “urban development” can now be seen through the lens of their effects on $dP_{\alpha, A}$, $dP_{\alpha, B}$ and $dx_A$, given $P_{\alpha, A}$ and $P_{\alpha, B}$.

• We will first consider the fixed population case, ie $dx_A = 0$, and then bring in the complications of migration.
The Fixed Population Case (1)

• Given Budget R to be allocated to A and B
• \( R = R_A + R_B \)
• Question: What is \( \frac{dP_\alpha}{dR_A} \) ?
• Answer depends, obviously, on what happens to \( R_A \) and \( R_B \) when they hit the distributions \( f_A \) and \( f_B \) respectively.
• If all expenditure goes to the poor in A, and all goes to the non-poor in B (or vice versa), the policy stance is clear.
The Fixed Population Case (2)

• Consider two cases: (i) there is leakage equally in the two jurisdictions and (ii) there is no leakage in either distribution.
• First consider the case of leakage.
• If there is leakage, we have to specify of what sort. One simple and tractable characterization is that $R_A$ is divided equally among all in A (whether rich or poor), and $R_B$ is divided equally among all in B.
The Fixed Population Case (3)

- It can then be shown (Kanbur, 1987) that
  \[ \frac{dP_\alpha}{dR_A} = -\left(\frac{\alpha}{z}\right) [P_{\alpha-1, A} - P_{\alpha-1, B}] \]

- Intuition can be seen from the expression
  \[ P_{\alpha, A} = \int_z \left\{ \frac{(z-y)}{z} \right\}^\alpha f_A(y) \, dy \]

- If \( R_A \) is divided equally among all in sector A, then each \( y \) goes to \( y + R_A/x_A \). Marginal effect of this on \( \left\{ \frac{(z-y)}{z} \right\}^\alpha \) is proportional to
  \[ \left\{ \frac{(z-y)}{z} \right\}^{\alpha-1} \]
The Fixed Population Case (4)

- In other words, if you want to minimize national $P_\alpha$, target public resources to the sector/jurisdiction with the higher $P_{\alpha-1}$
- So, if $\alpha = 1$, ie the national objective is to minimize $P_1$, target to the jurisdiction/sector with higher $P_0$ ie the higher Head Count ratio or Poverty Incidence.
The Fixed Population Case (5)

- On the other hand, if we could be confident that $R_A$ or $R_B$ would reach the poor in their respective jurisdictions, then with national poverty objective $P_1$, at the margin we would be indifferent between allocating resources to A or B (since either would reduce the income gap of the poor by the same amount).
The Fixed Population Case (6)

• An illustration for Malaysia: Kedah and Johore
• Kedah is a small state with a high incidence of poverty. Johore is a large state with a lower incidence of poverty.
• Question: what should go into the centre-state allocation formula? The fraction of a state’s population that is poor? Or the fraction of national poor who live in a state?
• The answers given by each of Kedah and Johore should be clear.
• The answers for a central government that wants to minimize national poverty depend on (i) the model of leakage and (ii) the degree of poverty aversion.
Complications of Migration (1)

- Recall: \( P_\alpha = x_A P_{\alpha, A} + x_B P_{\alpha, B} \)
- Now give an additional amount to jurisdiction A, which means less for jurisdiction B, and allow population to move in response (presumably from B to A).
- \( \frac{dP_\alpha}{dR_A} = -(\alpha/z) [P_{\alpha-1, A} - P_{\alpha-1, B}] + \frac{dx_A}{dR_A} [P_{\alpha, A} - P_{\alpha, B}] \)
- First term is effect on national poverty of poverty change within A and B. The second term is the effect on national poverty of population movement between A and B.
Complications of Migration (2)

• We need a model of migration and how it responds to public resource allocation to different jurisdictions, and how this migration translates into changes in poverty in each area.

• One model which could be used to integrate migration and income distribution is a Lewis-Harris/Todaro type model.
Complications of Migration (3)

- Rural wage $w_r$, urban modern/formal sector wage $w_m$, urban informal sector wage $w_i$. These three are given exogenously.
- Rural wage is certain. Urban modern wage is available with probability $\pi$, informal wage with probability $1-\pi$. 
Complications of Migration (4)

- Migration equilibrium

\[ \pi w_m + (1-\pi) w_i = w_r + p \]

where \( p \) is a premium on staying in the rural area, motivated by risk aversion, preference for origin location, etc.

- Rewriting:

\[ \pi = (w_r + p - w_i)/(w_m - w_i) \]
Complications of Migration (5)

• Population Allocation.
• Total population N is divided between modern sector \( L_m \), informal sector \( L_i \) and rural sector \( L_r \).
• \( L_m \) is fixed exogenously by profit maximizing labor demand in the modern sector with given wage \( w_m \).
• Specify probability of getting \( w_m \) as
  \[
  \pi = \frac{L_m}{L_m + L_i}
  \]
• This solves for \( L_i \) and \( L_r \) and thus for the whole income distribution.
Complications of Migration (6)

$L_m, w_m$

$L_r, w_r$

$L_i, w_i$

$Z$
Complications of Migration (7)

• This model was used by Anand and Kanbur (1985) to trace out the path of poverty in Lewis-type development scenario.
• But it also gives us the platform for some results on spending resources on urban development versus rural development if the objective is national poverty reduction.
• Assume that if spent in urban areas the resources will increase $w_m$ and $w_i$ equally, while resources spent on rural areas will all go to $w_r$. Increasing spending on the urban area will of course increase migration to urban areas.
Complications of Migration (8)

• Should scare public funds be spent on rural development or urban development?
• The answer depends on the precise objective function at the national level.
• If the national objective is the head count ratio $P_0$, then it is obvious from direct observation that it is better to spend on urban development.
Complications of Migration (9)
Complications of Migration (10)

• What about \( \frac{dP_\alpha}{dR_A} \) for \( \alpha = 1 \)?

• Recall

\[
\frac{dP_\alpha}{dR_A} = -(\alpha/z) [P_{\alpha-1, A} - P_{\alpha-1, B}] \\
+ \frac{dx_A}{dR_A} [P_{\alpha, A} - P_{\alpha, B}]
\]

• We need relative magnitudes of \( P_{\alpha, A} \) and \( P_{\alpha, B} \) for \( \alpha = 0 \) and \( \alpha = 1 \).
Complications of Migration (11)

• Start with $p = 0$, ie no risk premium.
• Obvious that Head Count Ratio in urban sector $(P_{0,A})$ is less than in rural sector $(P_{0,B})$.
• What about $P_{\alpha, A}$ and $P_{\alpha, B}$ for $\alpha \geq 1$?
Complications of Migration (12)
Complications of Migration (13)

• Notice that (i) income distribution in A is mean preserving spread of distribution B, and (ii) $P_\alpha$ is the expectation of the following function on $f(y)$:

$$\{(z-y)/z\}^\alpha \text{ for } y \leq z$$

$$0 \text{ for } y > z$$

which is convex in $y$ for $\alpha \geq 1$

• Thus $P_\alpha, A \triangleright P_\alpha, B$ for $\alpha \geq 1$
Complications of Migration (14)

- Recall again that
- \( \frac{dP_\alpha}{dR_A} = -\left(\frac{\alpha}{z}\right) [P_{\alpha-1, A} - P_{\alpha-1, B}] \)
  + \( d x_A / dR_A [P_{\alpha, A} - P_{\alpha, B}] \)
- We know that \( P_{0, A} < P_{0, B} \), and \( P_{1, A} > P_{1, B} \)
- So it must be the case that \( \frac{dP_\alpha}{dR_A} > 0 \) for \( \alpha = 1 \)
Complications of Migration (15)

• We have shown that
  \[ \frac{dP_0}{dR_A} < 0 \text{ and } \frac{dP_1}{dR_A} > 0 \]

• But since \( P_{1, A} > P_{1, B} \) and \( P_{2, A} > P_{2, B} \), the sign of \( \frac{dP_2}{dR_A} \) is ambiguous.

• The above results also hold for small enough risk premium \( p \).

• Thus the choice between “rural development” or “urban development” depends crucially on value judgments embodied in the value of \( \alpha \).
Conclusion (1)

• If the objective is national poverty reduction, the choice between expending resources on rural development and urban development depends in quite intricate ways on (i) the model of how the expenditure impacts the sectoral income distributions (ii) how migration is affected by these changes and (iii) the precise measure of poverty that captures national value judgments.
Conclusion (2)

• For example:

  – If there are no population movements and development expenditures are not well targeted, then if the national objective is $P_1$ resources should go to the sector with higher $P_0$. If expenditures can be well targeted, then they can be allocated in proportion to the numbers of the poor in each sector.

  – If rural-urban migration follows a Harris-Todaro logic, then if the national objective is $P_0$ urban development should have priority, but if the national objective is $P_1$ then rural development should have priority.
Conclusion (3)

• Further work:
  – Theory; specific results for $\alpha = 2$ for Harris-Todaro model.
  – Theory; application of framework for other migration models, eg with income heterogeneity and migration selectivity in rural areas.
  – Theory; dynamics with agglomeration externalities in urban areas.
  – Empirical; income distribution and poverty analogs to McMillan-Rodrik productivity decompositions.
  – Empirical; rural and urban development natural experiments (eg China, Brazil, India) and implications for income distribution and poverty.
Thank You!