On the urbanization of poverty

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Abstract: Conditions are identified under which the urban sector’s share of the total number of poor in a developing country will be an increasing convex function of the urban share of the total population. This is confirmed by cross-sectional data for 39 countries and time series data for India. The empirical results imply that the poor urbanize faster than the population as a whole. The experience across developing countries suggests that a majority of the poor will still live in rural areas well after most people in the developing world live in urban areas.

Key words: Urban poverty, rural poverty, urban population growth.

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1. **Introduction**

   As is well known, the incidence of poverty is higher in the rural areas of almost all developing countries.\(^2\) And (in the aggregate) most people still live in rural areas. So urban areas account for less than half — about 30% on average — of the poor.\(^3\) But, as is also well known, the population of the developing world is urbanizing quite rapidly. In 1995, 38% of people lived in urban areas, and this is projected to rise to 52% by 2020 (UN, 1996). Is the urban share of poverty also likely to grow? There is evidence that it has been doing so.\(^4\) Will the poor urbanize faster than the nonpoor? How long will it be before most of the poor live in urban areas?

   The answers to such questions have bearing on poverty reduction efforts. There are differences in the policy instruments for urban versus rural poverty. Judgements about whether current knowledge and action have the right sectoral composition for fighting poverty will then be influenced by how the urban-rural composition of poverty is expected to evolve. There may also be implications for understanding the political economy of anti-poverty policy. More spatially concentrated and visible forms of urban poverty are likely to generate new pressures on governments to respond, and in ways that may or may not be coincident with good policies for overall poverty reduction.

   To help throw light on these issues, this paper provides a simple theoretical representation of the urbanization of poverty in a developing country, and shows that this

\(^2\) Lipton and Ravallion (1995) survey the evidence on this point, and related work on rural-urban migration in developing countries.

\(^3\) Taking an un-weighted mean across the data set used in this paper, one finds that 68% of the poor live in rural areas. If one weights by the total number of poor the figure rises to 75%.

\(^4\) Haddad et al., (1999) compile urban and rural poverty measures for eight countries; for seven of them they find that the urban share of the total number of poor rose over time.
is consistent with poverty data for countries over a wide range of urban population shares. Implications are drawn for the future urbanization of poverty.

2. A theoretical representation of the urbanization of poverty

Let \( P_u(S_u) \) be a single-valued function from \([0,1]\) to \([0,1]\) giving the urban sector’s share of the poor when its share of the population is \( S_u \). This can be written as:

\[
P_u(S_u) = h(S_u)S_u.
\]

where

\[
h(S_u) \equiv \frac{H_u(S_u)}{H(S_u)}
\]

is the incidence of poverty in urban areas (\( H_u \)) relative to its national incidence (\( H \)). The latter is given by:

\[
H(S_u) = S_uH_u(S_u) + (1 - S_u)H_r(S_u)
\]

where \( H_r \) is the rural incidence of poverty. Since we are interested in the association between urbanization (a rise in \( S_u \)) and poverty, the urban and rural poverty measures are written as functions of \( S_u \); these functions are assumed to be differentiable. Writing the poverty measures as functions of \( S_u \) does not, of course, mean that \( S_u \) is exogenous; here the interest is in how these variables co-move, rather than causality.

What properties can we expect \( P_u(S_u) \) to have? At low \( S_u \), one can imagine a small urban enclave, containing the government and services. The poverty rate in this initial urban enclave is far lower than in surrounding rural areas. In the limiting case, we
can assume that $P_u(0) = 0$. At the other extreme, it must of course be the case that $P_u(1) = 1$. What shape might one expect the curve to have between these extremes?

To outline a simple model for addressing this question, suppose that escaping poverty in urban areas means getting a skilled “formal sector” job at a real wage rate that is fixed. An urban household is poor if it does not get such a job, and everyone is poor in the rural economy. The number of formal sector jobs per capita of the population is

$$L_u = (1 - H_u)S_u$$

which is also the national poverty rate in this model (since getting and urban formal sector job is the only way to escape poverty).

In this model, the process of urbanization generates external economies, such that productivity in the urban economy rises as its share of the population rises. In particular, the output of the urban formal sector is $\phi(S_u)F(L_u)$ where $\phi(S_u)$ is productivity-enhancing effect of urbanization, with $\phi'(S_u) > 0$, and $F'(.) > 0$ is the marginal product of skilled labor with $F^*(.) < 0$. Firms maximize profits, such that:

$$\phi(S_u)F'[1 - H_u(S_u)]S_u = W_u(S_u)$$

where $W_u$ is the urban wage rate which is assumed to be a non-decreasing function of $S_u$. In a competitive labor market, $W_u(S_u)$ is the (inverse) supply function of skilled labor. On differentiating with respect to $S_u$ and solving one obtains:

$$H_u'(S_u) = [1 + \epsilon(\eta - \omega)](1 - H_u)/S_u$$

and

$$H_u'(S_u) = \epsilon(\eta - \omega)(1 - H_u)$$

where

$$\epsilon = \frac{\partial \ln L_u}{\partial \ln W_u} < 0, \quad \eta = \frac{\partial \ln \phi}{\partial \ln S_u} > 0 \text{ and } \omega = \frac{\partial \ln W_u}{\partial \ln S_u} > 0$$
Consider first the case in which \( \eta > \omega \) (so that urbanization reduces national poverty) and assume that:

\[
1 + \frac{1}{\varepsilon(\eta - \omega)} < P_u(S_u) \quad \text{for all } S_u \text{ in } [0,1] 
\]

(6)

This implies that the urban poverty rate rises relative to the national rate as urbanization proceeds i.e., \( h'(S_u) > 0 \) for all \( S_u \). I shall consider the effect of relaxing the restriction in (6).

Under these conditions, the function \( P_u(S_u) \) must then be strictly increasing and convex throughout as illustrated in Figure 1. It is plain that \( P_u(S_u) \) is strictly increasing given that \( h(S_u) = P_u(S_u) / S_u \) is increasing in \( S_u \). It is also clear that \( P_u(S_u) \) cannot be linear in any interval, since this would mean that \( h'(S_u) = 0 \). The only other possibility is that the function is strictly concave in some interval. But then there will be a point \( S_u^* \) such that \( h(S_u) \) reaches a maximum within that interval, i.e., \( P_u'(S_u^*) = h(S_u^*) \). If \( S_u^* < 1 \) then \( h(.) \) must be a decreasing function for some \( S_u > S_u^* \) — again a contradiction.

When \( S_u^* = 1 \), \( P_u'(S_u^*) = 1 \). Since \( P_u'(1) = h'(1) + h(1) \) and \( h(1)=1 \), this requires that the left derivative of \( h \) vanishes, \( h'(1) = 0 \) — also a contradiction. So the function must be strictly convex throughout, as in Figure 1.

If \( \eta \leq \omega \) then the national poverty rate will be non-decreasing in \( S_u \) and the urban poverty rate will be strictly increasing in \( S_u \). However, it will still be true that \( h'(S_u) > 0 \) and that the function \( P_u(S_u) \) is strictly increasing and convex.
To illustrate a case in which the restriction in (6) does not hold, such that $h'(S_u) < 0$ for some $S_u$, suppose that (i) $\phi(S_u) = S_u$; (ii) the real wage rate is fixed ($\omega = 0$), and (iii) the labor demand function has constant elasticity, so that (4) can be written:

$$ (1 - H_u(S_u))S_u = (W_u / S_u)^\varepsilon $$

(7)

When $\varepsilon < -1$, the restriction in (6) fails for some $S_u$. Figure 2 gives the implied $P_u(S_u)$ functions for $\varepsilon = -1, -2, -3, -4$ (labeled (1), (2), ..). (The wage rate has been set such that the poverty rate when all the population is in urban areas is 0.1.) The curve becomes concave at higher elasticities of labor demand, and over a wider interval as the absolute elasticity rises.

3. Calibrating the curve to cross-country data

A specification for $P_u(S_u)$ with sufficient flexibility is a cubic polynomial, whereby $h(S_u)$ has the quadratic form:

$$ h(S_u) = 1 - \beta(1 - S_u) + \gamma(1 - S_u)^2 + \nu $$

(8)

where $\beta$ and $\gamma$ are parameters to be estimated and $\nu$ is a zero mean error term. $P_u(S_u)$ passes through $(0,0)$ and $(1,1)$ when the curve is evaluated at the expected value of $h$.

World Bank (1999, Table 2.7) provides a compilation of estimates of urban and rural poverty incidence for 39 countries. The estimates are drawn from country poverty studies by the World Bank, and all are based on household survey data. Methods of setting poverty lines vary between countries, however, and the differences can matter to
comparisons of urban and rural poverty incidence. These data would appear nonetheless to be the available data source for the present purpose. I will use the urban population share implicit in the urban, rural and national poverty rates, though I test sensitivity to using the Census-based urban population shares given in the same source.

Using these data, I initially regressed \( h - 1 \) on a constant term, \( 1 - S_u \) and \( (1 - S_u)^2 \); the constant and the coefficient on \( (1 - S_u)^2 \) were jointly insignificant (F=0.53, which rejects the null with probability 0.59). (White standard errors are used throughout.) If one sets the constant to zero then the coefficient on the squared term is not significantly different from zero (\( t = -0.66 \)) and the estimate of \( \beta \) is 0.451 with a standard error of 0.072. (Similarly, the constant term is insignificant if one suppresses the squared term.) Dropping both the constant and the squared term, I obtained an estimate of 0.468 for \( \beta \) with a (robust) standard error of 0.060 (n=39). The estimate is significantly positive, and significantly less than one. Figure 3 plots the data and fitted values.

So the data suggest that:

\[
P_u (S_u) = [1 - \beta(1 - S_u)]S_u
\]

with \( \beta \) around 0.5. The speed at which poverty urbanizes is related to the overall speed of urbanization according to:

\[
\frac{\partial \ln P_u}{\partial t} = \left( 1 + \frac{\beta S_u^2}{P_u} \right) \frac{\partial \ln S_u}{\partial t}
\]

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5 See Ravallion and Bidani (1994) who compare alternative methods of setting urban and rural poverty lines in Indonesia. Also see the discussion in Haddad et al., (1999).

6 If instead one uses the Census-based urban population shares the estimate is 0.473 with a standard error of 0.083.
At sample means \( S_u = 0.423; \ P_u = 0.321, \) with \( \beta = 0.468 \), the poor urbanize at a speed 26% higher than the population as a whole.

How much does \( H_u / H_r \) rise with urbanization? It is readily verified that:

\[
\frac{H_u}{H_r} = \frac{1 - \beta(1-S_u)}{1 + \beta S_u} \quad (11)
\]

\( H_u / H_r \) increases monotonically with \( S_u \) (with a slope of \( \frac{\beta}{(1 + \beta S_u)} \)). (Equation 11 is derived by first noting that \( H_u / H_r = h(1-S_u)/(1-hS_u) \) and then substituting \( h = 1 - \beta(1-S_u) \).

At its lower bound, \( H_u(0)/H_r(0) = P'_u(0) = 1 - \beta \) while \( H_u(1)/H_r(1) = 1/(1 + \beta) \). So, with urbanization, the urban poverty rate rises relative to the rural rate, but it does so rather slowly; between \( S_u = 0 \) and \( S_u = 1 \), the urban poverty rate rises from about one half to two-thirds of the rural rate.

4. Time series evidence for India

There are very few countries with the time series data needed to estimate (8). An exception is India, for which a reasonably long time series of comparable, nationally representative, household surveys allow us to study how the urban-rural poverty profile has evolved with urbanization. I repeated the above analysis using 14 survey rounds spanning 1974-1997/98.\(^7\) Again I found that a linear \( h \) function performed well giving an estimate of 0.151 for \( \beta \) with a robust standard error of 0.019. Again this is significantly positive (and less than one). However, the estimate is much lower than for the cross-

\(^7\) The data are from Datt (1999) and are a slightly updated version of the data set described in Özler, Datt and Ravallion (1996) and http://www.worldbank.org/poverty/data/indiapaper.htm.
country data. The “India curve” implies a lower urban-rural disparity in poverty rates, and this varies little with urbanization.

It may, however, be hazardous to try to infer what happens with urbanization from these data for India. Over this 25-year period, the urban share of the population in India spans a relatively narrow range, from 21% to 27%. By contrast, the cross-country comparisons above span a range from 10% to 85%. The India curve may be close to the 45-degree line at low levels, but fan out later.

5. Conclusions

Under certain conditions, the urban share of the poor in a developing economy will be an increasing convex function of the urban share of the population; the higher the initial level of urbanization, the larger the effect on the proportion of the poor living in urban areas of any given increment to the urban population share. Supportive evidence for this relationship is found in data for a cross-section of developing countries and in time series data for India.

If poverty urbanizes consistently with the cross-country relationship modeled above, then the urban share of poverty will reach 40% in 2020, when the urban share of the population is projected to reach 52% (UN, 1996). At the projected growth rate in the urban population share between 2015 and 2020 in UN (1996), the urban share of the total number of poor will reach 50% by 2035, when the urban population share reaches 61%.
References

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Figure 1: The urbanization of poverty

Figure 2: Urban share of poverty for various labor demand elasticities
Figure 3: Data for 39 developing countries

Urban share of population

Urban share of the poor