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Decomposing the Contribution of Migration to Poverty Reduction:

Methodology and Application to Tanzania

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Abstract

In an economy with migration, poverty changes are composed of a number of forces, including the income gains and losses realized by the various migration streams. We present a simple but powerful decomposition methodology that uses panel data to measure the contributions of different migration streams to overall poverty change. An application to Tanzania shows the new insights that are provided—in particular on the role of migration to secondary towns in poverty reduction.

JEL Codes: J61, O15, O55

Key Words: Panel data, household surveys, internal migration, urbanization, poverty reduction, decomposable poverty indices.

1. Introduction

In a purely accounting sense, the evolution of national poverty is an aggregate of the evolution of the poverty of each individual. Our understanding of the forces making for poverty changes at the economy wide level is enhanced by understanding the evolution of poverty among broad categories of individuals. These categories will depend on the specific focus of study—land holding, education level, gender, occupation, region of residence, etc. Our focus in this paper is on migration.

Internal mobility is a feature of developing economies, and the contribution of this mobility to poverty reduction is a matter of great analytical and policy interest. Specifically, migration from rural to urban areas is one of the great stylized facts of development, and such migration is proceeding apace in the developing world.[1] This is migration to the big city but also to small towns, and the contribution of these different streams of migration to poverty reduction is of particular interest.

This paper develops a simple but powerful methodology which can account for the relative contribution of migration streams to overall national poverty changes. The methodology uses decomposable poverty indices to allocate national poverty change to migrant and non-migrant populations. It can be applied using increasingly widely available panel data sets for developing countries, and takes us beyond the restrictions of past analyses based on repeated cross sectional data. The usefulness of the method is shown by application to Tanzania. It illustrates how new insights can emerge, in this case on the contribution to overall poverty change of city versus small town migration.

2. Methodology

Let there be n individuals in the economy and let individual i's income be denoted y_i. Let the poverty line be z. Then the FGT family of P_α poverty indices (Foster, Greer and Thorbecke, 1984) can be written:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{n}\left[\frac{z-y_i}{z}\right]^\alpha \quad (1)$$

where the summation is over all incomes below the poverty line. The parameter α is the degree of poverty aversion. When $\alpha = 0$, we get the standard poverty head count ratio. When $\alpha = 1$, we have the poverty gap measure. As α increases beyond 1, the index gives more and more weight to the poorest of the poor. It is also well known that P_α is sub-group decomposable across mutually exclusive and exhaustive groups, and can be written as a weighted sum of sub-group poverty, the weights being population shares of each group. Denoting g as the group index, and x_g as the population share of the g^{th} group, $g = 1,2,\ldots G$, we can write:

$$P_\alpha = x_1 P_{\alpha,1} + x_2 P_{\alpha,2} + \ldots\ldots + x_G P_{\alpha,G} \quad (2)$$

Suppose now that there are K locations in an economy, and that we can follow movements from location r to location s, in other words we have K^2 origin-destination pairs, including of course the pairs for which $r = s$, i.e. the non-movers. Then, if we have information on each pair of incomes, in origin and destination, from our panel data, we can decompose the change in national poverty by the change in national poverty for each of these K^2 groups. Denoting the change operator by Δ, we get:

[1] The basic facts are reviewed in Christiaensen and Kanbur (2017).

$$\Delta P_{\alpha} = x_1 \Delta P_{\alpha,1} + x_2 \Delta P_{\alpha,2} + \ldots\ldots + x_G \Delta P_{\alpha,G} \qquad (3)$$

Notice that the number of groups $G = K^2$, each group 1,2,.....being an origin-destination pair (*r,k*). The contribution of the pair (*r,k*) to national poverty change is thus:

$$\varepsilon_{rk} = [x_{rk} \Delta P_{\alpha,rk}] / [\Delta P_{\alpha}] \qquad (4)$$

where x_{rk} is the population share of those who started in location *r* and ended in location *k*, and $\Delta P_{\alpha,rk}$ is the change in poverty in this group. Note that a group's contribution to national poverty change, ε_{rk}, can also be negative. This can happen when that group's $\Delta P_{\alpha,rk}$ has the opposite sign as ΔP_{α}. For example in a context of rising poverty a subgroup realizing poverty reduction will have a negative ε_{rk} to indicate it is pulling the poverty numbers in the other direction. All these negative and positive ε_{rk} values sum up to unity across all (*r,k*) pairs.[2]

Notice also that the relative contribution of each stream to overall poverty change depends both on the per capita poverty change of that stream and on the relative size of that stream in overall migration flow. Economists have tended to focus on the former, but as we shall see it can be the latter effect which dominates quantitatively.

In the next section we quantify expression (4) to launch a discussion of whether it is migration from rural areas to cities, towns, or other rural areas, which contributes most to poverty reduction. This is further facilitated by quantifying which of the two forces contributed most to the overall impact of migration from rural areas, the average change in each stream ($\Delta P_{\alpha,rk}$) or the size of the stream (x_{rk})

3. Application

3.1 Data

Our empirical application uses the Kagera Health and Development Survey (KHDS), a long run panel data set spanning 1991/94 to 2010.[3] The baseline data were representative of Kagera, a primarily rural agriculture-based region in the North-West of the country. The survey is an early example of a panel data set that attempted to track and interview individuals who have moved out of their baseline locations, a practice becoming increasingly more common in other panel surveys in developing countries.[4] KHDS has maintained a highly successful tracking rate. In 2010, out of the 6,353 original respondents 4,339 (68%) had been located and interviewed, 1,275 had died and 739 (12%) were not traced. Of the interviewed people 2,073 had moved away from their baseline locations by 2010.

[2] This form of decomposition is common, but can result in share contributions that lie under -1 or above 1. This can happen, for example, when large but opposite poverty changes are observed across the different migration streams, which largely cancel each other out to result in little overall change in poverty. An alternative is to define $\varepsilon'_{rk} = [x_{rk} \Delta P_{\alpha,rk}] / \Delta P'_{\alpha}$ with $\Delta P'_{\alpha} = x_1 |\Delta P_{\alpha,1}| + x_2 |\Delta P_{\alpha,2}| + \ldots\ldots + x_G |\Delta P_{\alpha,G}|$. Using the weighted sum of the absolute poverty changes in each group as the denominator gives values ε'_{rk} between 0 and 1 for positive contribution and between -1 and 0 for negative contributions. The sum of the *absolute* values of these shares will also be 1.

[3] The survey is described in detail in De Weerdt et al. (2012).

[4] See http://surveys.worldbank.org/lsms/integrated-surveys-agriculture-ISA for a number of recent examples

The survey data requirements for the decomposition exercise are quite light and consist of, per panel respondent, information on change in location and change in welfare. The 2010 round collected location information, which we linked to each area's census classification, allowing us to distinguish between locations that are rural, towns or cities.[5] The consumption data originate from extensive food and non-food consumption modules in the survey, carefully designed to maintain comparability across survey rounds and controlling for seasonality. The consumption aggregate includes home produced and purchased food and non-food expenditure. The non-food component includes a range of non-food purchases, as well as utilities, expenditure on clothing/personal items, transfers out, and health expenditures. Funeral expenses and health expenses prior to the death of an ill person were excluded. Conservatively, rent is also excluded from the aggregate to avoid large differences in prices for similar quality housing being the driver of any measured urban-rural disparities. The aggregates are temporally and spatially deflated using data from the price questionnaires included in each survey round.

As household size may differ between urban and rural households it is useful to verify that results are robust to expressing the aggregates in per adult equivalent units rather than per capita. In our applications this makes little difference to the conclusions. The poverty line is calibrated to yield for our sample of respondents who remained in Kagera the same poverty rate as the 2007 National Household Budget Survey estimate for rural areas (37.6 percent). At the time of the survey one US dollar was worth around TSh 1,450.

3.2 Decomposition

Before coming to poverty, the top panel of Table 1 focuses on migrants' income growth. Those who have moved to the cities tripled their consumption in the 18 year period, while those who migrated to rural areas saw their consumption rise by a factor of 1.7. In 2010 those who migrated to the cities are over twice as wealthy as those who migrated to rural areas, despite relatively minor differences during the baseline in the early nineties. Those moving to towns fall somewhere between these two extremes.

These average, however, conceal the fact that from our sample only 350 migrants ended up in cities, while 637 were found in towns and 1,086 in rural areas. The last column of this panel shows that despite the much larger average growth per capita realised by the city dwellers, the fact that they are much fewer in number implies that they contributed less to *total growth* in the sample than those who moved to towns.

The middle panel of Table 1 looks at the same phenomenon through a poverty lens. This brings out the importance of the population size even more. While starting at similar levels, poverty is virtually eliminated among those who have moved to cities, but remains 14% among those who moved to towns and 35% among those who moved to rural areas. The headcount ratio drops by 0.41, 0.31 and 0.21 for people moving to cities, towns and rural areas, respectively. Once more the changes in average poverty rates hide the importance of the number of feet making these transitions. The last two columns of Table 1 show how moves to cities account for only 21% of all migrants who have transitioned out of poverty

[5] In 2010, households were found in three cities: Dar es Salaam, Mwanza and Kampala. This is defining cities as locations (districts) with more than 500,000 inhabitants. The 2012 census puts the population of Dar es Salaam at 4.36m and Mwanza at 0.7m. One caveat to bear in mind is that the census classification is based on 2002 data, while we observe respondents in 2010.

between 1991-94 and 2010, while migrants to towns contributed 35 percent and those moving to or within rural areas 40 percent. In other words, the contribution to poverty reduction of moves to or within rural areas was the largest, even though their poverty reduction per move was the smallest. There were just many more of them. These trends get further reinforced when using the poverty gap (P_1) instead of the headcount index (P_0), to measure poverty (bottom panel Table 1). All moves reduce the poverty gap, but moves to rural areas account for nearly half of the total change in the gap. Moves to cities account for the smallest part of total change in the poverty gap (21%).

4. Conclusion

How can we account for the contribution of different migration streams to the evolution of national poverty? One problem with the traditional cross-sectional "shift-share" methodology available in the literature for assessing a range of dynamic evolutions, as exemplified for example by the early work of Ravallion and Huppi (1991) or more recently by McMillan, Rodrik and Verduzco-Gallo (2014) is that they cannot identify specific migration streams and confound them into a single average for each migration destination instead, using original or final populations shares or some combination of the two. In this paper we have developed a simple but powerful decomposition methodology which uses panel data to quantify the contributions of different migration streams to changes in aggregate poverty.

In an application to Tanzania we show that the methodology can provide new insights and raise new questions. We show that the contribution to national poverty reduction of migration to small towns exceeds that of migration to the big city—the average move to the city reduces poverty by a significantly greater amount, but there are many more moves to the small town. This then opens up further questions as to why there are more moves, and what policy can do to reduce overall poverty by balancing investment in small towns versus big city (Christiaensen, De Weerdt and Kanbur, 2017). More generally, we hope that the methodology presented here can be part of a more concerted move to utilize the increasingly widely available panel data for detailed micro analysis of the processes of poverty reduction (Christiaensen and Kaminski, 2015).

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Table 1: Decomposing growth and poverty reduction by 2010 location

2010 Sector	*N*	Growth (yearly consumption per capita in 2010 TZS)			
		1991-94 average	2010 average	Change in average	Share in total growth
Rural	1,086	347,433	573,281	225,848	0.29
Town	637	387,955	883,446	495,491	0.38
City	350	404,445	1,210,922	806,477	0.34
TOTAL	2,073	369,617	776,247	406,630	1.00
		Poverty headcount			
		1991-94	2010	Change in headcount	Share in total net poverty reduction
Rural	1,086	0.56	0.35	-0.21	0.40
Town	637	0.46	0.14	-0.31	0.35
City	350	0.43	0.03	-0.41	0.25
TOTAL	2,073	0.50	0.23	-0.27	1.00
		Poverty Gap			
		1991-94	2010	Change in poverty gap	Share in total net poverty gap reduction
Rural	1,086	0.17	0.10	-0.07	0.48
Town	637	0.11	0.04	-0.08	0.31
City	350	0.10	0.00	-0.10	0.21
TOTAL	2,073	0.14	0.06	-0.08	1.00