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Dynamic Poverty Decomposition Analysis: An Application to the Philippines

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SUMMARY

In this paper, we propose a new method of poverty decomposition. Our method remedies the shortcomings of existing methods and has some desirable properties such as time-reversion consistency and subperiod additivity. Our decomposition integrates the existing methods of growth-redistribution decomposition and sector-based decomposition, because it allows us to decompose the change in poverty into growth and redistribution components for each group (e.g., regions or sectors) in the economy. Our decomposition works well in cases where only partial data are available for some periods. It is also flexible and can be extended to have the following six components: population shift, within-region redistribution, between-region redistribution, nominal growth, inflation, and methodological change components. The empirical application of the six-way decomposition to the Philippines for the period 1985–2009 shows that important policies for poverty reduction may differ across regions. For example, the Autonomous Region in Muslim Mindanao would need growth-enhancing policies, whereas Eastern Visayas would need policies to improve the income distribution. Our decomposition method has a wide applicability and may complement the poverty profile approach.

1. Introduction

Poverty statistics are the most basic piece of information for assessing the poverty situation of a country and for formulating antipoverty policies. With broader recognition of their importance, the availability of poverty statistics has significantly improved over the last four decades. The World Bank's Living Standards Measurement Study (LSMS) website alone lists 40 countries with household surveys,[1] and many other countries not in the list also routinely conduct surveys and publish national poverty statistics without much external assistance.

The quality of poverty statistics has also improved with the accumulation of knowledge and experience. Better survey designs have helped make the measurement of standards of living more accurate and more readily comparable across regions within a country and over years. As a result, we have a better understanding of the profile of the poor and its transition over time.

However, in the standard poverty profile approach, it is often unclear what has caused the observed change in poverty. Adding to this problem, the methodology used to derive national poverty statistics is not always uniform, making the poverty statistics incomparable across regions or over time. To address these issues, we offer a new methodology of poverty decomposition in this paper.[2]

Our method is highly flexible and allows us to decompose the poverty change into several components (e.g., growth and redistribution components) for each region or each sector in a country in a coherent manner, a feature most existing decomposition methods do not possess. While the Shapley decomposition allows us to do similar decompositions, it is still built on the unrealistic assumption that only one of the factors of interest is allowed to change at a time. As a result, even in situations where everyone is always above the poverty line and thus there is no poverty or poverty change at all, the Shapley decomposition may spuriously ascribe non-zero poverty contribution to some factors of interest. Furthermore, the treatment of multiperiod data and partial data are also unclear under the Shapley decomposition. These points will be elaborated subsequently.

[1] See http://go.worldbank.org/PDHZFQZ6L0 (accessed on May 6, 2017).

[2] Here, we are concerned with the case where the reference standards of living at the poverty line are not comparable across time. However, incomparability can occur for other reasons, such as the variations in survey design over time. See, for example, Lanjouw and Lanjouw (2001). Deaton and Kozel (2005) provide an overview of the related debate in India.

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We allow all the factors of interest to change simultaneously instead of fixing all factors but one. Unlike the existing decomposition methods, we use the time derivative of the poverty measure and apply the chain rule. The chain rule essentially allows us to express the total change in poverty as a sum of contributions from the factors of interest at each point in time. We then integrate back over time to find the contribution from each factor in a given period of time. Because the reference period is internalized in this calculation, our method does not suffer from the problems associated with the choice of the reference period. As discussed further, our integral-based approach also has an advantage that there is an obvious way to handle multiperiod and partial data.

The decomposition we propose is not only theoretically sound but also relevant for choosing appropriate policies to fight poverty. For example, in regions where economic growth is pro-poor but slow, policies to enhance regional economic growth (e.g., investment in infrastructure) may be an appropriate poverty reduction policy. On the other hand, in regions with high but anti-poor economic growth, distribution-improving policies (e.g., cash transfers) may be more appropriate.

Our method is also easy to implement, especially when a set of simplifying (but reasonable) assumptions are made. It produces a neat decomposition result that does not have an interaction term or residual, which is difficult to interpret. Further, as discussed subsequently, it satisfies two desirable properties of time-reversion consistency and subperiod additivity unlike the existing decomposition methods and offers a clear and intuitive recommendation about the way subperiod information should be used.

We apply our method to the Philippines for three reasons. First, the poverty reduction process in the Philippines has been slower than that of most other countries in Southeast Asia. It is therefore useful to identify the sources of slow progress in the Philippines. To this end, we decompose the poverty change in each region in the Philippines into six components: population shift (PS), within-region redistribution (WR), between-region redistribution (BR), nominal growth (NG), inflation (IF), and methodological change (MC). Our decomposition shows that most of the poverty reduction achieved by nominal growth is offset by inflation and worsening distribution within each region when we look at overall poverty change in the Philippines during 1985–2009. Our regional disaggregation results show that the sources of poverty change are heterogeneous across regions and thus the suitable poverty reduction policies also vary across regions. For example, we find that growth-enhancing policies are desirable for poverty reduction in the Autonomous Region in Muslim Mindanao (ARMM), whereas distribution-improving policies are also important in Eastern Visayas (Region VIII).

Second, the official poverty statistics in the Philippines are calculated with poverty lines that are specific to a region or a province. Therefore, the changes in the national statistics reflect not only the real changes in poverty but also the superficial changes due to the way official poverty lines are adjusted over time. By applying our method to the Philippines, we can separate the superficial changes from the observed changes. We find that the slow progress in the reduction of official poverty in the Philippines is partly driven by the superficial changes due to the change in methodology.

Finally, the Philippines has collected household income data once every three years since 1985. This allows us to see the poverty change over a relatively long period of time. Therefore, it is possible to see whether the driving force of poverty change has altered over time. We find that worsening distribution severely crippled the progress in poverty reduction in the two periods 1988–91 and 1994–97. In other years, the slow progress in poverty reduction was mainly explained by the lack of high real economic growth.

This paper is organized as follows. In the next section, we briefly review existing methodologies of poverty decomposition and develop a new method of dynamic poverty decomposition. In Section 3, we describe the data and discuss some measurement issues. In Section 4, we present the decomposition results in the Philippines. Section 5 provides some discussion.

2. Methodology

In this section, we develop a new method of dynamic poverty decomposition. To highlight the novelty of our method, we first introduce the notations and review the existing methods in Section 2(a). We then present our general decomposition method in Section 2(b). This method requires that we know the path of the changes in the factors of interest (e.g., mean and distribution of income). However, this requirement is typically not fulfilled in a practical application. Therefore, we will consider approximations that allow us to implement the method in a straightforward manner.

In Section 2(c), we consider a simple linear approximation, in which the relative poverty line (poverty line relative to the mean income) and the cumulative distribution function of the relative income (individual income relative to the mean income) change linearly. This assumption leads to a very simple expression when the poverty measure of interest is the poverty rate. In the Online Appendix B, we alternatively consider a log-linear approximation, where a linear approximation is used for the *logarithmic* relative poverty line and distribution of the *logarithmic* relative income. This approach also has some attractions as it has some relevance to pro-poor growth literature.

In Section 2(d), we compare our decomposition under the linear approximation with the existing poverty decompositions using a graph. We argue that our method has several theoretical and practical advantages. Because the approximation we use affects the decomposition results, it is important to check the robustness of our results. Therefore, we propose to investigate the sensitivity of our decomposition method to the speed of change in the mean income relative to that of the income distribution in Section 2(e).

In Section 2(f), we consider an extension of the method with six components to highlight the flexibility of our decomposition method. In this decomposition, each of the six components can be further divided by groups such as regions or sectors. This extension helps researchers and policy makers decide what poverty reduction policies are suitable for each group. Finally, we discuss some implementation issues in Section 2(g).

(a). Notations and existing methods

We assume that the individual-level poverty measure is determined by the individual income and poverty line. The nominal income per capita y is non-negative[3] and the income distribution at time t for the population of interest is given by the probability density function $f(y,t)$. The corresponding cumulative distribution function is denoted by $F(y,t)$ and we assume that it satisfies $F(0,t)=0$. The poverty line at time t, or the threshold income level below which the individual is deemed poor, is denoted by $z(t)(>0)$.

With some slight abuse of notation, we consider a class of poverty measures M that has the following form:

$$M(t) \equiv M(F(\cdot,t),z(t)) \equiv \int_0^{z(t)} g(y/z(t))f(y,t)\mathrm{d}y \tag{1}$$

where the function $g(\cdot)$ represents the individual-level poverty measure, which we assume is differentiable at any point on the unit

[3] Our decomposition results can be applied without modification to the cases where y is the nominal consumption per capita.