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Poverty Mapping: Testing the Methodology in Minas Gerais

● Chris Elbers, Peter Lanjouw, and Philippe George Leite

A rare opportunity to rigorously check poverty map estimates suggests that a World Bank method performs well

For the past decade researchers at the World Bank and partner institutions have been studying approaches for developing detailed “poverty maps”—maps providing estimates of poverty and inequality at the local level, such as the sub-district or even community. Such information is rarely available because household surveys typically have samples too small to permit sufficiently fine disaggregation. Yet efforts to use detailed spatial targeting for public interventions, or to monitor the gains from decentralization and community-centered development, create a pressing need for information on distributional outcomes at the local level.

One approach to poverty mapping, the “World Bank method,” combines household survey data with unit record data from the population census to expand the availability of pertinent information. This approach is aimed at providing not only estimates of poverty or inequality at the local level but also a sense of the precision of the estimates.

Opportunities to formally check the reliability of the local-level poverty estimates and their associated confidence intervals are rare. But validation exercises are needed if these small-area estimation methods are to enter into regular use and inform policy making. Indeed, a recent evaluation of World Bank

research expressed a concern that the World Bank method may yield overly optimistic assessments of the precision of its small-area estimates. And Alessandro Tarozzi and Angus Deaton, in a 2007 paper on using census and survey data to produce small-area estimates, argue that the World Bank method relies on crucial assumptions that, they claim, are likely to fail in most real settings.

The population census of Brazil offers a setting in which to “test” the applicability of the basic method and its underlying assumptions. In 2000 the Brazilian statistical organization, IBGE, fielded two questionnaires as part of its census. One of these, fielded to a 12.5 percent sample of households in each enumeration area, included a fairly good measure of total household income. The IBGE has not published any small-area poverty statistics based on this household income indicator because, while fairly detailed, the data are judged to be insufficiently comprehensive. But they do provide an opportunity to check the World Bank method.

In a recent paper Elbers, Lanjouw, and Leite use these data to compare the predicted welfare measures obtained using the World Bank method with the actual, observed values. For computational ease and tractability the authors focus on the single state of Minas Gerais. This state is often referred to as “Brazil within Brazil” because it shows the same geographic patterns as Brazil as a whole:

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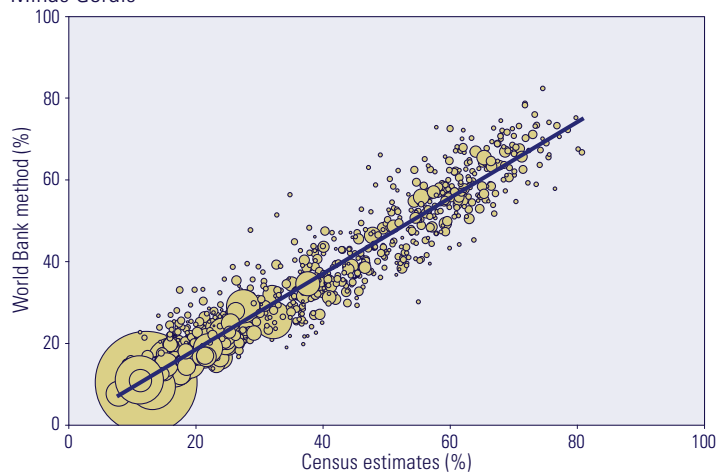
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Figure 1. Predicted and Actual Poverty Rates at the Municipality Level in Minas Gerais



Note: $R^2 = 0.88$. The size of each bubble is proportionate to the population size of the municipality.

low living standards in the north and northeast and high ones in the south.

The authors draw synthetic household surveys from the census—“pseudo-surveys”—mimicking the sample design of well-known household surveys in Brazil. A model estimated with these sample survey data yields parameter estimates that are used to impute incomes to individual households in the population census. These imputed incomes are then used to predict poverty at the level of each of the nearly 1,000 municipalities in the state. Finally, the authors compare the predictions with poverty rates calculated directly from the census sample.

The results suggest that the World Bank method performs quite well. The poverty estimates line up quite closely with the actual, observed poverty rates

in the municipalities (figure 1). Moreover, confidence intervals around the point estimates are moderate in size and encompass the “truth” broadly in accordance with the statistical precision they are intended to reflect.

Further empirical research, conducted in different settings, is clearly needed. But the World Bank method emerges from this validation exercise as a legitimate procedure to explore in settings where directly measured local-level poverty rates are unavailable.

Chris Elbers, Peter Lanjouw, and Philippe George Leite. 2008. “Brazil within Brazil: Testing the Poverty Mapping Methodology in Minas Gerais.” Policy Research Working Paper 4513, World Bank, Washington, DC.

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