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Why the Poor in Rural Malawi Are Where They Are: An Analysis of the Spatial Determinants of the Local Prevalence of Poverty

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Efforts to reduce poverty at the national level often fail because the reasons people are poor vary from one locale to another. Therefore, research based on spatial information, such as poverty mapping, to pinpoint where the poor are located and why they are poor has come to the forefront in recent years. It is hoped that such research will make it possible to target effective poverty alleviation programs to the right locations.

To better understand the causes and prevalence of poverty for small local populations (2,000 to 4,000 persons) in rural Malawi, this research aims to identify the spatial determinants of poverty prevalence through a quantitative analysis. It does not focus on individuals or households but on the agroecological and aggregate social characteristics of the communities in which they reside. Potential poverty determinants were identified using the risk chain concept, which holds that a household's welfare is determined by the risks it faces and how it copes with those risks: Risk (shock)→Response to risk→Outcome in terms of welfare.

The unit of analysis here is the population residing in aggregated enumeration areas (EA) in rural Malawi. These geographical units were constructed by combining statistical EAs to form units with a minimum household population of 500. Data on poverty for each aggregated EA were drawn from a poverty mapping analysis that linked results from the 1997–98 Malawi Integrated Household Survey to the 1998 Malawi Population and Housing Census. Variables on potential determinants of poverty prevalence were extracted from a broad set of relatively high-resolution spatial data that has been developed for Malawi. Since the study is confined to rural areas where virtually all households earn their living through agriculture and natural resources, agroecological conditions loom large among the determinants considered.

Methodology

To provide contrasting insights into the links between the spatial determinants of poverty and its prevalence, two spatial data analysis methods were used: (1) a global spatial error model that takes into account the spatial

dependence in the data, and (2) a geographically weighted regression (GWR) procedure that describes local relationships between the determinants of poverty and its local prevalence. Whereas a single spatial error model was computed for all of rural Malawi, using GWR, separate models were computed for each of the 3,004 aggregated EAs in the data set.

The prevalence of poverty in a local area was calculated through poverty mapping, which enables estimates of aggregate poverty to be computed at a considerably more spatially disaggregated level than is possible using survey information, thus enhancing our understanding of the spatial dimensions of poverty. Using the poverty mapping models for Malawi, poverty estimates were computed for the populations living in each of the aggregated EAs.

Twenty-six independent variables were selected from the spatial data sets, using the risk chain framework for guidance. One of the most challenging aspects of this research is the problem of static versus dynamic concepts. Economic vulnerability is a dynamic concept reflecting the probability of being poor in the next time period, while poverty status is static as it represents the welfare state of a household or individual at a particular point in time. Though efforts were made to incorporate temporal elements into the spatial variables being considered as determinants, the analysis did not succeed in providing

substantive insights into household vulnerability in the rural aggregated EAs. Other problems faced included endogeneity, differences in the geographic scale of the data used, and uneven data quality.

The spatial error model that the spatial regression model employed assumes that the determinants of the prevalence of poverty are global in their

effects—that is, their relationship to the level of poverty observed does not vary across space. In other words, the determinants identified in the spatial error model are said to be spatially stationary. While useful at the national scale of analysis, such a model potentially hides considerable heterogeneity (spatial non-stationarity) in the

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nature of the relationship between the determinants considered and local poverty prevalence. The GWR method provides a way to assess the degree to which the relationship between the determinants of poverty and its prevalence vary across space.

Results

Of the 24 independent variables tested in the spatial error model, only eight were significant. Good rainfall in 1997–98, when the survey data were collected, likely caused that variable to be significant, as it may have increased consumption and reduced poverty.

The variable on average maize yield was significant and positive; a puzzling finding because it implies that areas with higher maize yields will have a higher proportion of the population being poor. One possible explanation is that such high-potential areas attract large numbers of poor migrants. The variables for crop diversity and the level of nonagricultural economic activities were also significant.

Other significant variables in the global spatial error model include the ratio of dependents to household size and average maximum educational attainment. The Gini coefficient of consumption inequality was significant, as well as the variable for matrilineality, which was also positive. This implies that the matrilineal inheritance system dominant in some areas of rural Malawi may result in a relatively higher prevalence of poverty.

The same dependent and independent variables were used for the GWR regression. Because each variable has more than 3,000 coefficients, standard regression results were difficult to present. Because GWR generates so much information, the best way of managing the plethora of data is by creating maps, which are included in the paper.

The variables that were significant in the global model were generally significant in the GWR model as well: higher average maize yields still result in higher poverty

levels and the availability of nonagricultural economic activities is associated with lower poverty levels, for instance.

The expected association of higher education with lower poverty was surprisingly inconsistent in the GWR models, however. In general, higher education levels are an important factor in reducing poverty. In the north of the country, however, the association between education and poverty is strong and positive. In other words, for unknown reasons, people in such areas, though better educated than most, are not benefiting from their knowledge. Their higher levels of education do not enable them to raise their consumption and overcome poverty. This implies that efforts to improve education as a poverty reduction strategy should be directed to areas that do not show this perverse association.

In summary, the spatial error model controls for spatial autocorrelation and identifies a restricted number of significant determinants, most of which were in line with expectations. However, the challenge of understanding why a few determinants, such as maize yields, were unexpectedly significant and positive in relation to poverty remains.

The GWR model results can be used in two ways: to determine the causes of aggregate levels of poverty for a particular small area, or, where the causes of poverty in a locale differ from the overall results for the country, to undertake further investigation to find out why this is the case. Based on the spatial variation uncovered in this study, a strong argument can be made for adopting a strategy of aiming poverty alleviation efforts at the district or subdistrict levels rather than instituting national poverty reduction “package” programs that are insufficiently flexible and unable to reflect this local variation in the determinants of poverty prevalence.

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