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www.elsevier.com/locate/worlddev

World Development Vol. 41, pp. 232–244, 2013

0305-750X/$ - see front matter

http://dx.doi.org/10.1016/j.worlddev.2012.06.006

Targeting Maps: An Asset-Based Approach to Geographic Targeting

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Summary. — Proper targeting of policy interventions requires reasonable estimates of the benefits of the alternative options. To inform such decisions, we develop an integrated approach stemming from the small-area estimation literature that estimates the marginal returns to a range of assets across geographically defined subpopulations. We create a series of maps that can be overlaid with traditional poverty maps to identify strong candidate areas for intervention, though an efficiency/equity tradeoff sometimes exists. We apply our method using recent Ugandan data. Results are consistent with independent empirical findings and suggest asset specific transfer schemes would improve with a spatially targeted strategy.

Key words — geographic targeting, assets, poverty maps, spatial variation, Uganda

1. INTRODUCTION

Improved targeting of development interventions has long been recognized as central to increasing the impact from poverty reduction efforts. However, effective targeting requires reasonable estimates not just of who or where the poor are, but also of where the returns to various programs are likely to be highest. Put differently, targeting concerns "what" and "where" questions every bit as much as the more familiar "who" questions. No means currently exist, however, for estimating and comparing expected benefits across space and across alternative interventions, much less of linking such estimates to the spatial distribution of poverty. In this paper, we develop a method that, first, estimates the marginal returns to a range of assets, allowing returns to vary by household and by geography and, second, maps the estimated marginal returns to the various assets, creating a visual tool that can inform the targeting decisions of an asset transfer scheme.

This paper's motivational and methodological starting point is poverty mapping. Elbers, Lanjouw, and Lanjouw (2003) pioneered a technique that combines detailed, nationally representative household survey data with national census data to estimate poverty rates at fine levels of disaggregation for an entire country. Once estimated, the poverty rates for the different regions of a country can be used to create a poverty map, a visual representation of the spatial distribution of poverty. [1] This simple tool is popular and widely used by governments, NGOs, and donors in low-income countries to guide poverty reduction efforts. [2]

Although poverty maps can facilitate policy discussions, they offer no explicit recommendation as to the best means of alleviating poverty. If a government is trying to reach a specific welfare target such as the Millennium Development Goals, poverty maps can at best guide the government to regions with high poverty rates. They do not, however, inform the critical subsequent choice of what exactly the government should do in that region.

Targeting maps address this crucial shortcoming of poverty maps by answering two general questions: (1) for a given region, which asset building activity will have the largest marginal gross benefit? and (2) for a given type of asset building activity, in which regions are the marginal gross benefits largest? Good answers to either or both of these questions can improve the efficacy of targeted, asset-based development programs. Answers to the first question are paramount for those wishing to cut poverty by the most efficient means possible. The second question appeals to groups interested in investments of a specific type, such as Heifer International in building livestock holdings or The Nature Conservancy in safeguarding natural resources. With scarce resources available to finance transfers, targeting maps can help identify where poverty reduction efforts are likely to generate the most bang-for-the-buck.

This approach takes as given the desirability of geographic targeting. The idea of geographic targeting is to determine a subset of geographic regions most in need and then transfer benefits first (or only) to individuals within the chosen regions. While there are several methods of targeting aid, such as a proxy-means tested targeting, community-based targeting, categorical or indicator targeting, and self-targeting, the

* We appreciate helpful discussions with Nancy Johnson, GIS data assistance from John Owuor, and Ugandan data advice from Thomas Emwanu. Useful comments were received from seminar participants at Cornell University, the International Food Policy Research Institute, the International Livestock Research Institute (ILRI), and the World Bank and two anonymous referees. Financial support was provided by ILRI and the National Science Foundation Expeditions Grant in computational sustainability (number 0832782). Final revision accepted: June 6, 2012.

empirical evidence suggests that geographic targeting is particularly effective for poverty alleviation (Baker & Grosh, 1994; Coady, Grosh, & Hoddinott, 2004) and is easier and less expensive to monitor and administer than other methods (Bigman & Fofack, 2000).

The major disadvantages to geographic targeting are that non-poor individuals living in targeted regions receive benefits (leakage) and poor individuals not living in targeted regions do not receive benefits (undercoverage). One remedy that is routinely applied is to combine geographic targeting with additional targeting tools to limit leakage. Coady *et al.* (2004) survey 122 targeted transfer programs and find the mean number of targeting tools used is more than two; for example, Mexico's celebrated PROGRESA/Opportunidades program uses four (Coady, 2006). A second solution is to target more finely partitioned regions. As regions become increasingly disaggregated, within region heterogeneity decreases and targeting performance increases (Baker & Grosh, 1994; Elbers, Fujii, Lanjouw, Ozler, & Yin, 2007).

In this paper, we build on the proven successes of geographic targeting and propose an enhanced, asset-based approach. We explore the possibility of transfers from an entire range of private and public assets, such as livestock, mobile phones, means of transportation, and access to roads or microfinance institutions. Our focus on assets stems from the importance of a household's asset portfolio in determining the nature, extent, and persistence of poverty and vulnerability (Adato, Carter, & May, 2006; Ellis & Freeman, 2004; Moser, 1998). Further, if and where poverty traps exist, asset transfers may push households beyond an asset poverty threshold and allow them to engineer their own escape from income poverty (Carter and Barrett, 2006).

While in-kind transfers can appear paternalistic, as they constrain household choice in ways that cash transfers do not, there are several reasons why an asset-based approach could perform better than a monetary approach.[3] First, imperfect markets can make it difficult for households to procure desired assets; this is a common rationale for in-kind food or seed aid in many remote or disaster-affected regions. Second, in-kind transfers may stick to the targeted households better than cash because of the well-established endowment effects associated with physical goods but not with cash. For example, the findings of Hoffmann, Barrett, and Just (2009) suggest that in-kind transfers of mosquito nets would result in greater use of the nets than would equivalent cash transfers. Third, some assets—especially public goods such as paved roads—are not readily available for private purchase. Fourth, in-kind transfers often enjoy greater political support than do monetary transfers. Further, monetary transfers, due to their ready divisibility, may also be subject to a high rate of social taxation compared to a lumpy asset, perhaps undoing efforts to control leakage. And in practical terms, governments and charitable organizations routinely make in-kind transfers so improving the efficacy of such interventions is desirable even if one believes cash transfers are generally preferable.

The targeting maps tool introduced in this paper improves the information set guiding geographic targeting of in-kind transfers. Given substantial spatial heterogeneity in poverty incidence and its causes (Emwanu, Okwi, Hoogeveen, Kristjanson, & Henninger, 2007; Kam *et al.*, 2005; Okwi *et al.*, 2007), there is little reason to believe that any single transfer form is best suited for all places in a country. Likewise, asset valuation is inevitably spatially heterogeneous, given the place-specificity of many complementary inputs—e.g., agro-ecological conditions that affect livestock value, economic activity that affects the returns to transportation infrastructure. If poverty and the returns to assets both vary markedly across space for a variety of geographic, institutional, policy, and technological reasons, then it is desirable to exploit the predictable component of such variation in targeting asset-based development interventions. Previous research has found considerable intra-regional variation in expected returns to different development investments, such as high yielding seed varieties and roads, in Africa and Asia (Fan & Chan-Kang, 2004). By customizing asset-based interventions to specific geographic areas, significant gains could be made in cost-effectively addressing poverty. Our approach integrates spatially-explicit estimation of the marginal benefits to multiple assets into a single framework such that inter-asset comparisons of expected marginal benefits can be made for each region and linked to spatially-explicit poverty estimates.

While poverty maps offer a ranking of areas based on need, targeting maps rank areas in terms of the size of marginal benefits. This presents the possibility that high returns may not correspond to need, and thus a tradeoff between equity and efficiency is necessary. However, this tradeoff is present regardless of whether or not targeting maps are used. Targeting maps help to quantify the tradeoff, but also highlight synergies between equity and efficiency. In this paper, we do not judge which targeting schemes are best, we merely provide flexible empirical tools that can help inform the process with the preferences of the policy maker guiding the process. Ultimately, we envision the targeting maps output being used as one of several components, including poverty maps and local knowledge, informing a targeted asset transfer plan.[4]

The method of creating targeting maps, detailed in Section 2, involves several distinct steps similar to those involved in creating a poverty map. Using detailed household survey data and spatially explicit environmental and infrastructure data, we apply multivariate regression and bootstrapping techniques to estimate the returns to various assets and to determine how the estimated returns vary across space. We then project the parameter estimates onto the broader national census data and calculate the marginal returns as a function of projected estimates and current household asset holdings, while simultaneously estimating household-specific poverty status, this latter output is very similar to conventional poverty mapping. Finally, we aggregate the estimated marginal returns across households for small geographic areas and, using Geographic Information Systems (GIS), generate maps of both the magnitude and scope of estimated benefits as well as a poverty map.

In Section 2, we also discuss limitations of the methodology, largely centered around issues of endogeneity. Our estimation strategy necessarily ignores bidirectional causality between assets and welfare and unobserved household heterogeneity, both of which could bias estimates. This is a serious concern, but one that is unfortunately unavoidable in any analysis that tries to answer the questions posed above. There is no feasible way to estimate marginal returns to many assets across a large geographical space with ironclad identification. We submit that an explicit, albeit clearly imperfect decision tool is better than none at all and thus that targeting maps deliver useful information that can improve the efficacy of development interventions. While it is impossible to argue a purely causal relationship, understanding how households' asset portfolios and local environment covary with their welfare can nonetheless provide useful insights to inform development interventions. Given the considerable policy and operational importance of the questions targeting maps address, this tradeoff is attractive. Perhaps future research can ameliorate this shortcoming.