

## Chapter 4

# Point Density Estimation of Changes in Income Polarization in Tanzania, 1992–2001

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### ABSTRACT

*Data from two Household Budget Surveys in 1991-1992 and 2000-2001 in Tanzania indicate that there is no change in inequality between the two surveys. In spite of this finding, and impressive macroeconomic gains, there is growing discontent throughout the country because of the belief that the change from socialist to market policies has worsened income inequality. In this chapter, the authors argue that the Gini index fails to capture some inconspicuous trends in the income distribution, particularly the problem of polarization across space. Using polarization measures based on point density estimation of alienation and identification, they analyze changes in the distribution of household income in Tanzania in the 1990s. Unlike analyses that rely on the Gini index, the authors find that polarization increased significantly between 1992 and 2001. They also find evidence of increased spatial variability across regions and lack of spatial convergence of household incomes.*

### 1. MOTIVATION AND INTRODUCTION

Data from the two Household Budget Surveys (HBS) of 1991-1992 and 2000-2001 in Tanzania indicate that there is no change in the inequality between the two surveys (Demombynes and Hoogeveen, 2004). Yet there is growing discontent throughout the country that the economic reforms during the 1990 from a socialist to a market economy, although resulting in impressive macroeconomic gains, worsened the income distribution. It is not uncommon to hear anecdotal

comments that the reforms have benefited only a few at the expense of the majority, although the Gini indexes between 1991 and 2001 do not indicate significant changes in the overall income inequality. However, as we will show, this does not rule out the possibility that other trends, particularly the problem of polarization across space, has actually increased.

This chapter addresses the following policy issues: Does the Gini index tell the entire story about the changes in income distribution in the 1990s? If yes, why is there such an outcry that

the reforms of the 1990s have worsened the distribution of income? Is this outcry supported by evidence that the Gini index fails to capture? Finally, we ask: What is the spatial variability of this index?

Using recent theoretical and estimation developments, we analyze the spatial-temporal variations in polarization in Tanzania, employing the point density estimation of Identification-Alienation framework proposed in Duclos et al. (2004). The main premise of this framework, which differs from standard inequality measurements, is that alienation must also be complemented by a sense of identification such that a combination of the two generates an index which is sensitive (in the same direction) to both elements of inequality and equality. This last attribute of polarization the Gini index fails to capture.

One of the main econometric problems in the estimation of polarization indexes is how to estimate the size of the groups to which individuals belong (Wolfson, 1994; Esteban and Ray, 1994). The Esteban-Ray polarization index is based on a discrete and finite set of income groupings located in a continuous income distribution. As a result, two problems arise. The first is the artificial discontinuity introduced by grouping a continuous distribution. The second problem is the assumption that the population has already been bunched in the relevant groups. This assumption is particularly serious for our study because there is no reason to assume that relevant groups have remained stable throughout the 1990s, when Tanzania witnessed massive social and economic transformation (URT<sup>1</sup> 2002). To avoid the two problems associated with the use of the Esteban-Ray polarization index, our research uses the framework of Duclos et al. (2004). In this case, group based estimation is replaced with point density estimation, whereby the density is estimated non-parametrically.

Data for this study come from the Tanzanian HBS of 1991-1992 and 2000-2001 and Tanzania GIS data are from the International Food Policy Research Institute (IFPRI). A brief description of the GIS data can be found in Mduma and Wobst

(2005). The empirical analysis establishes that there has been a statistically significant increase in polarization in Tanzania between 1992 and 2001. The increase has also been shown to have substantial spatial variability, but only few regions in the country registered a decline in polarization.

The rest of the chapter is organized as follows. Section 2 provides a brief overview of Tanzania's income distribution. Section 3 presents the theoretical and empirical framework of this study. The results of the analysis are presented and discussed in Section 4. Section 5 provides conclusions.

## **2. OVERVIEW OF INCOME DISTRIBUTION IN TANZANIA**

From 1967 until the second half of the 1980s, Tanzania's economy policy followed socialist rules and excessive income inequality was strongly discouraged.<sup>2</sup> Thus, income inequality was less pronounced than in most neighboring countries. Under socialism, most large companies were managed by the government. Thus, the government became the largest employer<sup>3</sup>, both in urban and in rural region, with the exception of small-scale agriculture, and it also standardized most salary scales. There were no incentives for private entrepreneurship because it was considered exploitive. Furthermore, rural cooperatives, crop boards, and the regional trading companies were the only legal institutions allowed to carry out large scale commercial activities in rural areas. As a result of such measures, wide inequality in income distribution was less common in different sectors of the population. Toward the end of the 1980s, Tanzania's economic policy started to shift from socialist principal toward the gradual embrace of market policies. In the early phase of the reforms, important changes included the licensing of private crop buyers, abolishing the cooperatives, and the privatization of the parastatal<sup>4</sup> enterprises.

The reforms intensified in the 1990s, when Tanzania enacted several laws to encourage market forces. The nationally and regionally representa-

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