Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

HSC003-05 Room:201A Time:May 26 15:35-16:00

Rainfall Variability and Farmers' Resilience in Semi-Arid Tropics of Zambia

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Risk coping and consumption smoothing in rural areas of developing countries, where people's livelihood is often subject to various risks, have been well documented. However, the literature has not properly considered the time required for households and/or individuals to recover their level of consumption. To address the lack in the literature, we have incorporated the time dimension in the process of recovery from a shock in this paper. For this purpose, we have adapted the concept of resilience from ecology and define it in the context of consumption smoothing. Moreover, unlike most previous studies on consumption smoothing, we utilize weekly data collected before and after a covariate shock so as to provide empirical evidence of resilience.

In this paper, we provide an empirically workable definition of "resilience" at the household level. Resilience is based on the measurement of household food consumption per capita and is defined by the speed of the recovery of food consumption from a shock. Then, following the definition, we empirically estimate resilience using data collected in a rural area of Zambia, where its rain-fed agriculture is highly affected by rainfall variation. In this particular dataset, a heavy rain took place in December 2007. Resilience is measured as the speed of consumption recovery after the heavy rain shock.

Our panel data analyses reveal that the heavy rain caused a shock, i.e., reduction of food consumption, among the sample households, and it took almost one year for them to recover from the shock. Our analyses also show that household assets, such as land and livestock, have a positive effect on enhancing resilience. Then, dividing the sample into rich and poor groups based on the value of cattle holdings, we conducted similar analyses for each group separately and found that households in the rich group were more resilient than those in the poor group. The results indicate that some poor households that lack sufficient assets may not be able to recover consumption. Moreover, it is found that households in the poor group were more sensitive to the rainfall shock: they reduced consumption more quickly after the shock than did those in the rich group. We do not indicate in this paper how the sample households recover their consumption from the shock such as labor supply and livestock sales. Incorporating those coping behaviors is our next research topic as we have enough data to do it.

Keywords: rainfall variability, shock, resilience, farm household, sub-Saharan Africa, Zambia