Agricultural efficiency, malaria incidence and health expenses among Ugandan farmers

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Introduction

The linkage between farmer’s status and agricultural efficiency has received a great deal of attention from both health and agricultural literatures. Illness and death from malaria, tuberculosis and other diseases affect negatively agricultural production through loss of labor, productive adults’ knowledge, and assets to cope with illness. Hawkes and Ruel (2006) argue that in agricultural communities, poor health reduces income and productivity. Audu and Ebrahim (2003) observed a 26 percent increase in labor productivity from control of schistosomiasis in rice-growing areas in Mali. In Kenya, Fox et al. (2004) found that HIV-positive workers plucked 4.2 and 7.9 kilograms per day less tea leaves, used significantly more sick leave and other leave days, and spent more time doing less strenuous tasks.

Unlike previous studies, using household agricultural production framework, we introduce an explicit health production function that accounts for households’ own health expenses disaggregated into consultation, medicine, and hospitalization as additional instruments. Our findings also confirm the significant impact of health variables such as distance to health facility and health expenses on malaria incidence. In addition, the results point to the possibility of minima levels beyond which health expenses start improving farmers’ health status.

Analytical Framework

We assume that each farmer chooses optimal level of agricultural staple (C), market purchased good (C), and leisure (L) to maximize his utility

\[ U(C, L) = \frac{C^{\beta} L^{1-\beta}}{1-\beta} \]

under the following cash constraint

\[ p_{f}C + p_{s}C + w_{f}L = Y \]

where, \( p_{f} \) is the price of purchased good; \( p_{s} \) price of agricultural staple; \( Q_{f} \) farmer’s production; \( w_{f} \) market wage; \( x \) variable inputs (e.g. fertilizer) with price \( w_{x} \); \( E \) non-labor income (remittance, social transfer, etc.); \( L \) the total labor input and \( L \) the family labor. Effective family income is expressed as follows:

\[ Y = \sum_{i} p_{i}x_{i} + E \]

where \( p_{i} \) is a measure of farmer’s efficiency, with \( \sigma_{p_{i}}^{2} \), and \( \sigma_{x_{i}}^{2} \) represents variation in crop yield, price and income. (Fox, M.P., S. Rosen, W. B. MacLeod, M. Payot, C. And M. T. Etard. (2003). “Productive Benefits after Investment in Health in Mali,” Economic Development and Cultural Change 51: 760-991.)

Data

Data are from the Ugandan National Household Survey 2005-2006, which covered about 1,400 nationally representative households. This is a comprehensive survey with five modules: socioeconomic, agriculture, community, market, and qualitative. It includes data on production and sales of different crops. The dataset also includes a total of 35 health sector attributes over more than 600 communities.

Empirical Model

Given endogeneity of malaria incidence, we use an IV-Tobit of the following form

\[ y_{i} = \alpha + \beta x_{i} + \epsilon_{i} \]

where, \( y_{i} \) is a 1x1 vector of endogenous malaria incidence, and \( m_{i} \), \( m_{i}^{*} \), if \( \epsilon_{i} = \Phi(\mu_{i}) \) is a 1x1 vector of exogenous variables; \( x_{i} \) a 1x1 vector of additional instruments; \( \Phi(\mu_{i}) \) is \( \Phi \) a standard normal cumulative distribution function.

Conclusions

Overall, the results point to the possibility of minima levels beyond which health expenses start improving farmers’ health status and subsequently agricultural efficiency. These cut-off points can be used by policymakers to determine the optimal level of health transfers to farmers in order to increase agricultural efficiency. Most of sub-Saharan African countries are under strong pressure to directly address widespread poverty. This pressure has been heightened through the need for meaningful progress toward the achievement of the Millennium Development Goals (MDGs). Since most of these countries operate under tight budget constraints, the only option that remains is to devise strategies that maximize the contribution of social services to labor productivity in agriculture and the rural areas by devising strategies to decrease the impact on farmers’ income levels and workplace productivity. The results point to the possibility of minima levels beyond which health expenses start improving farmers’ health status and subsequently agricultural efficiency. These cut-off points can be used by policymakers to determine the optimal level of health transfers to farmers in order to increase agricultural efficiency. Most of sub-Saharan African countries are under strong pressure to directly address widespread poverty. This pressure has been heightened through the need for meaningful progress toward the achievement of the MDGs.