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The role of microcredit in older children's nutrition: Quasi-experimental evidence from rural China

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ABSTRACT

This article evaluates the causal impact of rural households' borrowing, through formal microcredit, on child nutrition in poor northwest China. The analysis exploits the panel data in rural Gansu between 2000 and 2004. Unobserved differences between borrowers and non-borrowers are controlled for in a dynamic fuzzy regression-discontinuity design creating a quasi-experimental environment for causal inference. Both anthropometric and micronutrient measures of child nutrition are investigated. Borrowing formal microcredit improves parent-reported health status and weight, and alleviates anemia and zinc deficiency. All effects nevertheless appear to exist in the short-term only.

Introduction

The impact of microfinance has been widely examined in many developing countries and a positive role for microfinance in reducing poverty measured by income or consumption has been documented (e.g., Imai et al., 2010 for India; Imai and Azam, 2012 for Bangladesh; Li et al., 2011 for rural China). In addition to improving economic well-being, it is also believed that access to microcredit may relax agents' credit constraints and provide a means of consumption-smoothing and therefore, improve social well-being by increasing expenditure on health and education (Armendáriz de Aghion and Morduch, 2005). However, evidence is not yet conclusive. Some literature finds positive correlation between access to credit institutions and health outcomes in Indonesia (Deloach and Lamanna, 2011) and between access to microcredit and expenditure on health in poor peri-urban Vietnam (Doan et al., 2011), but there is no significant impact of microfinance on borrowers' schooling and health in India (Banerjee et al., 2009). To my knowledge, in the context of rural China, however, there has been no empirical and causal examination of the effectiveness of microcredit *per se* on child nutritional status.

Children's nutrient intake in rural China has recently gained much attention (e.g., Luo et al., 2012; Shi et al., 2012). Recent reviews for developing countries (Currie and Vogl, 2012; Alderman, 2012) show that nutritional insults in childhood can pose long-term challenges for adult earning-potential and human capital formation. In China, childhood health also exhibits strong effects on adult health outcomes (Smith et al., 2012). However, a significant number of rural children do not have adequate access to micronutrients in rural China, despite a 12.6% annual increase in per capita net income and 10.8% annual growth in per capita consumption for Chinese rural households over the past two decades (1990–2010).[1] 12.8% of rural children (<15 years old) in 7 central and eastern provinces are anemic (Li et al., 2013). 65.3% of rural children aged 1–2 years in northern China have vitamin D-deficiency, leading to a rickets prevalence of 41.6% (Strand et al., 2009). In a poor western province, Shaanxi, where rural household per capita net income ranked within the bottom 5 out of 31 provinces between 1990 and 2010,[2] 38.3% of fourth-year primary school students suffer from iron deficiency (Luo et al., 2012).

It is suggested by the aforementioned studies that the government should take responsibility for micro-nutrition supplementation to rural children. Although supplements would be integral to child development, praxis may be deterred by the tight budgets of local governments, especially in poor areas. Health education

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[1] Author's calculation based on data from Rural Household Survey conducted and published by the National Bureau of Statistics in China Statistical Yearbook 2011. Monetary variables in this article are transformed to real terms at 1990 prices by the rural consumer price index from the same source.

[2] Author's calculation based on data from Rural Household Survey conducted and published by the National Bureau of Statistics in China Statistical Yearbook 2011.

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for parents informing them of their children's malnutrition could not alleviate the problem either (Shi et al., 2012), but would incur high costs (Ma et al., 2008). By conducting field experiments, Wang et al. (2009) find that food fortification in terms of nutrient fortified complementary food supplements can effectively prevent iron deficiency for children aged 6–12 months in poor rural Gansu province. Nevertheless, it would be difficult to extend such programs of direct therapeutic food distribution to older children until their adolescence in poor rural areas in China. For one thing, such large-scale interventions are less likely to be disbursed adequately and continuously by local (county) governments after decades of fiscal decentralization, especially in poor rural areas, in view of their limited fiscal capacity and strong incentives to achieve goals of economic growth compared to other aspects of human well-being. For another, at the household level, Chinese rural households confront various shocks and have limited capability to cope with them. 71% of rural households in 10 provinces are credit rationed, which brings about losses of 12–13% in income and 15–16% in consumption (Rui and Xi, 2010). These problems would undermine households' sustainable widespread use of food supplements for children and weaken demand for healthcare when the child is in ill health.

Given the above circumstances, microcredit might offer a solution. There are a number of ways borrowing microcredit can affect child nutrition and health status. In rural China microcredit enables households to earn more income by engaging in more profitable production and out-migration (Li et al., 2004) and raises consumption (Li et al., 2011). More income in turn increases food consumption as well as household demand for a higher quality diet (Yu and Abler, 2009).[3] Microcredit also serves as an effective means to smooth consumption for rural households in the presence of health shocks (Armendáriz de Aghion and Morduch, 2005; Gertler et al., 2009; Islam and Maitra, 2012). With more credit, households may be more able to smooth their food consumption against various risks and shocks and therefore, maintain children's nutritional and health status. To the extent that microcredit brings about higher income and enhances the household capacity for resisting risk, a potential role played by borrowing microcredit could be expected to increase care and investment in child health and hence to improve child nutritional status.

Different from the existing studies examining the benefits of access to microfinance (e.g., Deloach and Lamanna, 2011; Doan et al., 2011; Foster, 1995; Gertler et al., 2009), this article provides the first empirical attempt to test the causal impact of borrowing through formal microcredit *per se* on child nutritional outcomes. The present study also contains methodological advantages in dealing with endogeneity between borrowing and child nutritional outcomes. The analysis uses a fuzzy regression-discontinuity design (RDD) to reflect the unobservables between borrowers and non-borrowers. RDD is known to have milder assumptions and higher internal validity compared to other widely used 'natural experiment' strategies of impact evaluation, such as difference-in-difference, instrumental variables and propensity score matching, and can provide a quasi-experimental environment to extract more credible causal inferences (Lee and Lemieux, 2010). More importantly, the analysis takes dynamic impact of microcredit into account. As indicated by Islam (2011), it may take rural households a long time to build their capacity in order to meet the requirements of microcredit programs and the impact of borrowing behavior on their livelihood may also take time to be realized. Such possible progressive effects will be investigated further in a dynamic fuzzy RDD. The results of this article will also contribute to the on-going debate on the effectiveness of microfinance on raising borrowers' social well-being in the aspect of nutrition by providing new evidence from rural China and may inform policy intervention to tackle child malnutrition in poor regions.

In general, the empirical analysis reveals positive influence brought by formal microcredit uptake to rural children's nutrition outcomes. Borrowing formal microcredit appears to improve parent-reported health status and weight in the short-term, while this positive impact dissipates quickly over time. In regard to micronutrients, formal microcredit can increase zinc intake and alleviate child anemia temporarily for new borrowers.

The article proceeds as follows. The next section describes the dataset. 'Mehodology' section sets up the model. 'Results and discussion' section shows the appropriateness and credibility of the usage of fuzzy RDD and discusses the estimation results. Concluding remarks and possible implications for policy are summarized in 'Conclusion' section.

Data

The present study uses the Gansu Survey of Children and Families (GSCF) in 2004, which was initiated by the World Bank and recently supported by the United Kingdom Economic and Social Research Council/Department for International Development (ESRC/DfID) Joint Scheme for Research on International Poverty Reduction. The surveys were conducted locally by the National Bureau of Statistics Gansu Branch in collaboration with the Northwest Normal University and the Centre for Disease Control. Gansu has long lagged behind other provinces in China's progress to economic prosperity. The rural household per capita net income amounted to only 25.8% of that of Beijing and 54% of the national average in 2010 and had then been in the bottom 3 of the 31 provinces for a decade.[4]

The dataset includes 1918 older children aged between 12 and 20.[5] Each young adult was selected from one sample household spread across 100 villages in 20 counties. Some samples are dropped when estimating the assignment variable $\hat{p}_i$ and Eqs. (5), (6) because of missing values. The final sample size in regression reduces to 1128–1283, which will be shown in Tables 3 and 4 in the next section. The following descriptive statistics in this section therefore only focus on the upper sample size of 1283 in 95 villages out of 20 counties.[6]

543 sample households (42.3%) lived below the World Bank international poverty line of US$1.25/day, measured by their per capita consumption. The present study focuses on formal microcredit only, as China has stringent regulations for financial markets and restricts the entry of non-governmental financial institutions. Rural Credit Cooperatives (RCCs) are the largest formal microcredit provider in rural China (Li et al., 2011). RCCs services are available in almost every township and most villages in rural China (Li et al., 2011), which mitigates the non-random placement bias. Household borrowing from RCCs appears to be limited, although the government has been introducing financial reforms to facilitate lending to rural households since the early 2000s. Only 424 households (33.1%) arranged formal loans. 491 households (38.3%) felt it

[3] They estimated the quality-corrected income elasticities of demand for grain, vegetables and dairy products as 0.31, 0.35 and 0.18 in turn.

[4] Author's calculation based on data from Rural Household Survey conducted and published by the National Bureau of Statistics in China Statistical Yearbook 2011.

[5] 87% of them were 16-year old or younger. Only 3 observations were of 18- to 20-year olds.

[6] One may be concerned with biased estimators generated by the reduced sample size. I inspected this by comparing the descriptive statistics for key variables such as microcredit borrowing decisions, child health indicators and household wealth between remaining households in final regressions, those having been dropped during estimation procedures, and by testing for the difference of the mean of each variable. The *t*-statistics are all less than 2 (from 0.17 to 1.24), indicating that we cannot reject the null hypothesis of zero difference between two groups.