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Measuring the Impact of Microfinance on Child Health Outcomes in Indonesia
Revision 3

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Abstract

Microfinance has become a staple of modern development policy as a means to facilitate anything from gender equality to growth. It can facilitate the sharing of health-related information among parents, promote the bargaining power of women in the household, aid in the development of important health-related infrastructure, and help households smooth consumption in the wake of unexpected economic shocks. Using data from the Indonesian Family Life Survey (1993-2000), we find that the presence of microfinance institutions in communities significantly improves the health of children.

JEL Codes: G21; I1; J13
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1. INTRODUCTION

A large body of literature exists on the determinants of child health,[1] but because much of the early work was limited to cross-sectional data, research on the intertemporal determinants of child health is still developing. Over time, children's health can be disrupted in numerous ways. Household idiosyncratic shocks like prime-age adult mortality or illness lead to significant changes to household income and wealth.[2] If households are unable to smooth consumption in the wake of such shocks, the negative effects on child health may be substantial. Similarly, non-idiosyncratic shocks such as drought or financial crisis can also be detrimental to children's health.

The impact of these non-idiosyncratic, macroeconomic shocks on child health outcomes is just now beginning to be understood. Hoddinott and Kinsey (2001) find that the 1994-1995 droughts in Zimbabwe significantly lowered annual growth rates for children, with the effects still present four years after the drought. Similarly, Yamano, Alderman, and Christiaensen (2005) find that the drought in Ethiopia from 1996-1997 resulted in increased rates of child stunting. Paxson and Schady (2005) report an increase of 2.5 percentage points in the infant mortality rate for children born during the economic crisis in Peru in the late 1980s. Using panel data from Russia during its recent economic transition, Fedorov and Sahn (2005) conclude that time-varying economic determinants related to household income and macroeconomic indicators like food prices account for a relatively large amount of the variation in child growth, far more than had been previously found in studies using cross-sectional data. One implication of these studies is that macroeconomic policy has a potentially important role in determining child health outcomes.

One such policy that offers great promise is microfinance. Microfinance has become a staple of modern development policy as a means to facilitate anything from gender equality to poverty reduction (Khandker 2005). One way that microcredit has been hypothesized to influence child health outcomes is through the development of parents' social capital. In a recent study, Nobles and Frankenberg (2009) find that children from households with lower levels of wealth and human capital fare better when their mothers are more active participants in community organizations. The reason participation is thought to influence child health is that these informal networks provide a way for parents to circulate information about such things as nutrition and communicable diseases. In this sense, social capital in developing communities plays a similar role in the improvement of child health as formal maternal education does in more developed communities (Nobles and Frankenberg 2009).

Another related mechanism for affecting child health is through the empowerment of women. Historically, microfinance has often been aimed specifically at increasing women's access to credit. As Miller and Rogers (1999) argue, anything that improves the economic well-being of women will affect household bargaining power. With greater power, women are in a better position to bargain for a greater share of household resources to be allocated towards expenditures that improve the health and well-being of children.

In addition to expanding the social capital of parents and the economic power of women, the presence of microfinance institutions in a community is likely to affect child health through more traditional mechanisms. For example, the availability of credit for entrepreneurs is likely to lead to economic diversification and wealth creation throughout the community. This increase in wealth will eventually support the development of health-related infrastructure such as sanitation and medical facilities.

Credit also provides an important tool for smoothing household consumption in the wake of unexpected shocks. In a recent article, Gertler, Levine and Moretti (2009) investigate the importance of access to microfinance institutions in the wake of heterogeneous shocks. They find that access to credit significantly improves consumption smoothing in the wake of adult illness. Of course, credit can also help households respond to macroeconomic shocks. For example, Foster (1995) found that, compared to those without access to credit, households in Bangladesh with such access were better able to smooth household consumption following the floods of 1988. He speculates that small-scale lending programs such as microcredit may even be able to positively affect child health outcomes in the face of these kinds of macroeconomic shocks. To date, however, we know of no other research that has attempted to quantify such an effect.

The purpose of this paper is to determine whether the presence of microfinance institutions within a community affects child health outcomes. This study uses data from the Indonesian Family Life Survey (IFLS) 1993-2000. The IFLS not only collects anthropometric data on children, but it also has detailed information at the community level regarding the types of financial institutions available as well as other key infrastructure that typically come with development. In addition, because the survey itself spans the years of the Asian financial crisis and its aftermath, it provides an interesting case in which to examine the effects of changes in the presence of microfinance institutions on child health. Between 1993 and 1997, Indonesia experienced significant growth immediately preceding the crisis that started in late 1997. From 1997 through the eventual recovery, communities not only experienced large variations in income and wealth, but also in the presence of factories, sanitation, health facilities and, of course, microfinance.[3] The idea is to exploit this shock-induced variation to distinguish the

effects on child health due to changes in the presence of microfinance and those due to changes in other indicators associated with community development.

The organization of the paper is as follows: (1) a brief history of microfinance institutions in Indonesia is provided, including a taxonomic discussion of modern institutions and their defining characteristics; (2) the econometric model is presented with specific attention to how we address the issue of identification; (3) the data are defined and descriptive statistics for the sample are discussed; (4) results for the models are presented; and (5) relevant implications are discussed.

2. MICROFINANCE IN INDONESIA

Indonesia's microfinance industry is one of the oldest and most commercialized in the world. In this section we provide a brief overview of the development of Indonesia's financial system as it pertains to our focus on the types of microfinance institutions available throughout Indonesia during our sample period.[4] Of particular interest are the financial reforms that have enabled the spread of these financial institutions throughout the country as well as the key differences that exist among the major institutions.

According to the World Bank (Ravicz 1998), starting a century ago *Badan Kredit Desas* (BKDs) were the first village-owned institutions to offer credit in Indonesia. In 1970, *Bank Dagang Bali* (BDB), a private bank in Bali, became the first Indonesian bank to offer microfinance commercially. Within the next decade, Indonesia's government, recognizing the value of access to credit in reducing poverty, made improved credit access for the poor a primary strategy for poverty reduction. The government even established subsidized credit programs to encourage and promote microfinance. Despite the programs, expansion remained restricted as a

result of limited banking licenses and the central bank's (*Bank Indonesia*) firm control over interest rates and refinancing targets.

Charitonenko and Afwan (2003) discuss the impact of more recent reforms. A combination of reforms in 1983 (liberalized interest rates, abolished credit ceilings) and the deregulation package PATKO in 1988 (new banking licenses, relaxed regulations on bank branching and deposits) encouraged the expansion of rural banks, including the largest microfinance institution (MFI) in Indonesia, *Bank Rakyat Indonesia* Units (BRI Units). After the major reforms of the banking sector in the 1980s, microfinance continued to expand through a country-wide shift in focus and increased supervision and regulation of the microfinance industry. In 1990, the government essentially abandoned its subsidized credit approach by terminating thirty of thirty-four major programs providing subsidized credit. While the government removed its largely unsuccessful programs, BRI Units provided a model for other MFIs looking to expand and improve their services by providing non-subsidized credit through savings mobilization and improved loan recovery.

Increased supervision and regulation came in the form of several banking acts and ministerial decrees throughout the 1990s, further mobilizing capital for the microfinance industry (Charitonenko and Afwan 2003). The Banking Act of 1992 recognized *Bank Perkreditan Rakyats* (BPRs) as secondary banks subject to regulations and ratings similar to primary banks, making them more attractive to potential investors. With more investors, BPRs were able to increase their capital, expand, and provide more loans. In 1998, Ministerial Decree No. 352 encouraged the establishment and improved performance of *Koperasi Simpan Pinjams* (KSPs) and *Unit Simpan Pinjams* (USPs) (the two cooperatives permitted under Government Regulation

No. 9 of 1995). The expansion of MFIs resulting from increased supervision and focus on performance resulted in more rural dwellers gaining access to credit.

MFIs in Indonesia continued to expand during the 1990s. In 1996, the government launched the ambitious "Prosperous Family Program" operated by the National Family Planning Coordinating Board (BKKBN), with nearly 10 million Indonesian families participating in just 12 months (Conroy 2003). According to Charitonenko and Afwan (2003), as of 2001, state-owned BRI served nearly 30 million clients (2.8 million borrowers) through its 3,823 BRI Units (sub-branches) and 240 branches. By 2001, BRI accounted for 43.5 percent of the total value in outstanding loans in Indonesia. As of June 2000, there were approximately 4,566 BKDs located primarily in rural Java.

Based largely on the degree of commercialization, Charitonenko and Afwan (2003) classify Indonesian microfinance institutions as formal or informal[5] (see Table 1). While formal, commercialized MFIs dominate the industry, semiformal institutions such as nonbank financial institutions, credit unions and cooperatives play a particularly important role at the village level. Unlike their larger and more commercialized counterparts, the smaller, semiformal MFIs cater to poorer citizens. Smaller MFIs typically charge higher interest rates and make much smaller loans. According to data from the IFLS 2000 survey, the average loan in 2000 from private commercial banks was just over Rp 2.7 million. In contrast, at the smaller, cooperative banks the typical loan was just under Rp 930,000.

Two examples further highlight these differences. The largest MFI in Indonesia, *Bank Rakyat Indonesia* Units (BRI Units), is a commercialized microfinance institution that caters to non-poor borrowers. They require collateral equivalent to the loan principal and interest to be paid, which is typically a flat interest rate of 1.5 percent per month. On the other hand, *Badan*

Kredit Desa (BKD) is a village-level financial institution managed by the village bureaucracy. According to Charitonenko and Afwan (2003) BKD typically charges a flat interest rate of 3 percent per month. The average loan size at these banks also differs. According to Charitonenko and Afwan (2003), BRIs average loan size is Rp5.6 million ($538 in 2001). However, the smaller BKD's average loan size is only Rp300,000-400,000 ($34-45 in 2001).

< TABLE 1 here >

While microfinance in Indonesia has existed for a long time, reforms in the 1980s and 1990s led to increased expansion and improved credit access for the poor. Even in the wake of the Asian financial crisis that began in 1997, access to MFIs continued to improve throughout the 1990s. This is particularly important given that the majority of loans are used not for the expansion of production, but for the maintenance of household consumption. According to data from the IFLS 2000 survey, 43 percent of loans taken out were reported to be for normal household expenses[6] while less than 30 percent were for purposes related to business or agricultural investments.

As Indonesia's financial industry has evolved, two distinct types of institutions have developed to serve the market. Larger MFIs tend to be more formal, make larger loans and serve relatively less-poor borrowers. On the contrary, smaller, semi-formal MFIs, tend to serve the very poor; consequently, they make considerably smaller-sized loans. They are also frequently the first type of microfinance institution to enter a community. As will be clear in the following sections, the differences in the type and size of MFIs within a given community play an important role in affecting child health outcomes.

3. ECONOMETRIC MODEL

Consider the health, *h*, of the *i*th child, in household *g*, in village *j* at time *t*. Child health outcomes are commonly measured by anthropometrics like height or weight (or combinations of these). According to Strauss and Thomas (1998), height is the best long-term indicator of nutritional status in children. Moreover, height has also been shown to be correlated with productivity, wages, and long-run growth (Strauss and Thomas 1998). For this reason, we follow the literature and use height as our proxy for child health. Following convention, we normalize height by conditioning on both age and sex as is done is recent studies that use the IFLS such as Frankenberg, Suriastini and Thomas (2005), and Nobles and Frankenberg (2009).

The underlying structural model can be written as:

$$h_{igjt} = X_{gjt}B + \xi MFI_{jt} + c_i + \delta_g + \mu_j + \gamma_t + \varepsilon_{igjt} \quad (1)$$

where *X* represents household and community effects that vary with time, *MFI* is a dummy variable denoting the presence of a microfinance institution in the community, *c* represents individual fixed effects, δ represents household fixed effects, μ is community fixed effects, and γ denotes time effects. A great deal of literature over the years has concentrated on identifying the household fixed effects that affect child health. The most obvious of these is education of the mother.[7] One way to control for these fixed effects is to rewrite the model in first-differences. The advantage of estimating the model in first-differences rather than as a fixed-effects model is that autocorrelation is addressed at the same time. Thus given the nature of our dependent variable (child height), the difference model is the most reasonable way to specify our model:

$$\Delta h_{igjt} = \Delta\gamma_t + \Delta X_{gjt}B + \xi\Delta MFI_{jt} + \Delta\varepsilon_{igjt} \quad (2)$$

Before discussing the critical issues involving the econometric identification of the effects of MFIs on child health, there is an important issue relating to the treatment of the $\Delta\gamma_t$

term that must be addressed. This term represents the average changes in z-scores over time after controlling for the other determinants of change in health. If Indonesian children are on average catching up to the rest of the world in terms of height, then this term would be positive. If they are falling further behind, it is negative. But there is another issue present. Because we are tracking children over time, we expect there to be some degree of reversion to the mean within Indonesia itself. That is, those children who are measured below average in height in 1993 are likely to grow faster than their peers who measured above average. Analysis of the distribution confirms this occurrence as the standard deviation of z-scores in the sample decreases throughout the sample period. To avoid the simultaneity bias that would occur if we included a lag of the dependent variable as an additional regressor, we have chosen to simply include a dummy variable to denote if the child was below the 50^{th} percentile in height relative to his Indonesian peers in 1993.[8] As a result, the constant plus the coefficient on this dummy variable will estimate the average change in the z-score for height for those children starting off below the 50^{th} percentile. Obviously, the sign on the dummy variable should be positive and significant. The combined effect of the constant plus the dummy is ambiguous because while there is reversion to the mean, we expect the mean Indonesian child to be falling behind relative to the international standard. The constant term by itself will estimate the average change for those children starting off above the 50th percentile. This term should be negative and significant.

In equation 2, ΔMFI represents the change in the presence of a microfinance institution at the community level. It is expected that when a community gains a microfinance institution, child health improves ($\xi>0$). There are a number of theoretical reasons why access to microfinance might positively affect children's' health.[9] First, the presence of MFIs in a community offers parents a new way to participate in a semi-formal social network. In poorer,

less-educated communities, parents share vital information about health-related issues through informal networks. Recent research by Nobles and Frankenberg (2009) confirms this effect. By increasing parents' social capital, participation in community organizations appears to improve children's health. Second, microfinance has historically been aimed at increasing the earnings of women. Any policy that enhances the economic power of women will also have positive spillovers to children because women are more likely than men to invest in children's health and education (Miller and Rogers 1999). Third, because microfinance promotes long-term economic development, we expect to see a simultaneous improvement of children's health. As communities develop, the public and medical infrastructure associated with better health will typically improve. Fourth, the presence of microfinance institutions has a direct impact on families' access to credit. When faced with binding budget constraints, families with access to credit during times of crises (such as the Asian financial crisis) are better able to smooth their consumption, allowing them to better provide inputs to child growth.

The first challenge of the empirical methodology is to try to separate out these competing effects on child health. Because we are able to observe many of the developments such as increases in sanitation, healthcare facilities, cottage industries, factories, etc., the effect of MFIs on child health via broad-based development should be captured by these regressors. As we discuss below, controlling for total household expenditures on food should capture the effect of consumption-smoothing. Thus, holding food consumption and development constant, any change in MFIs that affects changes in children's height is most likely due to the changes in social capital that assist in transmitting health-related information to parents or changes in the bargaining power of women in the household.

ΔX_{gjt} is the matrix of changes in household and community characteristics that vary over time. Typically, researchers attempt to control for changes in household income. Because such measures are unreliable and poorly measured in developing countries, it is common to use a broad measure of household consumption. The assumption is that increases in total expenditures will allow for greater resources to be allocated to children's caloric intake and healthcare. Unfortunately, the consumption measures provided in the IFLS do not allow us to observe expenditures on healthcare directly. We found the most robust measure to be total expenditures on food, rather than a broader measure that would include spending on non-health-related items. Because a rise in the number of household members, all else equal, will decrease the resources allocated to any one child, we divide total food expenditures by total household size. Inflation will also decrease the resources available to each child. We have accounted for this by converting food expenditures into constant 2007 prices using deflators provided by the World Bank. For urban areas, a deflator based on urban CPI was used, while another based on rural poverty lines was used to deflate prices in rural areas. As noted above, the use of consumption as a control variable arguably allows us to isolate the effects of MFIs not related to consumption smoothing by households.

As discussed above, it is also important to account for other community-level changes across time as such development is likely to be correlated with the arrival (or departure) of MFIs into (or out of) the community. Changes in community characteristics that affect child health come from two sources. The first accounts for the presence of manufacturing firms (e.g., factories, cottage industries) in the community. Both factories and cottage industries may indirectly affect child health by enhancing the economic status of women. This in turn is likely to result in an increase in the share of household resources devoted to children (Miller and

Rodgers 2009). These industries may also provide insurance for both households and the community in the face of drought or other events that threaten agricultural output. On the other hand, the presence of factories could harm child health through increased pollution or incidence of child labor. The second category of community-level characteristics that affects child health is represented by changes in health-related infrastructure such as sanitation and medical care. The IFLS asks a number of relevant questions that allow us to attempt to control for these characteristics. These include whether there is a sewage system in the village, whether there is a medical post in the village, and the number of *posyandu*[10] in the community.

One possible problem is that these community-level changes may themselves be endogenous. The reason is that the communities expected to see the largest increase in access to medical care or sanitation will be those places that did not previously have such access. On average, these are likely to be the poorest communities. At the same time, the children in these communities are likely to be among the worst in terms of health. If the effect of improvements in community infrastructure takes time to positively affect child health outcomes, then the estimates of B in equation 2 will be biased downward. We test for this possibility in section 5.[11]

The second major challenge relates to the identification of MFI itself. As described in Section II, different banks serve different purposes and different clientele. Small banks, or semi-formal MFIs, often serve the very poor and are also frequently the first type of microfinance institution to enter a community. As a result, it is entirely plausible that in poorer communities initially lacking access to MFIs, obtaining a new *small* bank will have a greater impact on child health than obtaining a large bank. Moreover, as will be apparent in the following section, most of the variability in access to MFIs across communities in our sample period comes as a result of these smaller MFIs either entering or exiting.

Using community-level access to MFIs allows us to avoid the problem of endogeneity that arises from unobserved shocks to the household budget constraint that simultaneously affect children's health and increases the likelihood of borrowing. Of course, because most of the smaller MFIs discussed in Section II are sponsored at least in part by the government, policy-endogeneity is introduced. Policy-makers and bank officials have an incentive to introduce MFIs into the poorest, most needy communities. Because these are also the very communities with the worst healthcare and child nutrition, such endogeneity will bias ξ downward. Similarly, the entrance of MFIs will be simultaneously determined with changes in child health if there is unobserved heterogeneity at the community level. Such heterogeneity could result from changes associated with broad-based economic development not captured by variables such as changes in sanitation, access to medical care, etc., that were discussed above.

To deal with the endogeneity of changes in the availability of microfinance, we estimate the model where we instrument for ΔMFI using changes in community characteristics that are uncorrelated with changes in health. For a number of reasons, larger, more urban, communities are more likely to gain microfinance institutions. Logically, bank officials are more likely to introduce new MFIs to the areas in which they are expected to have the greatest impact. These would be the larger, more urban communities that lack MFIs. Once established, MFIs in these urban areas are also more likely to remain. In addition to whether a community is urbanized, there are other changes in community-level characteristics that are likely to be good instruments for ΔMFI. Electrification is one change in infrastructure that occurs in the early stages of community development, but that has no direct impact on health. It is likely to help spur the growth of small businesses that also require capital. As a result, changes in electrification are likely to be a suitable instrument for the change in MFIs.

4. DATA AND SUMMARY STATISTICS

This study uses data from the first three waves of the Indonesian Family Life Survey (IFLS). The IFLS is a longitudinal socioeconomic and health survey based on a random sample of Indonesian households. The survey collects data on individuals and their respective households and communities, including information on fertility, health, education, migration, employment, and community resources. The survey sample represents 83 percent of the Indonesian population living in 13 of the country's 26 provinces. The first wave (IFLS1) was conducted in 1993 and covered a sample of 7,224 households. The second (IFLS2) and third waves (IFLS3) were conducted in 1997 and 2000, respectively. In most cases children have reached their adult height by age 15; thus our sample consists of children 0-7 years old in 1993. Our strategy is to follow the anthropometric development of children through their most formative years. Because the effects of changes in institutions are measured relative to the base year in 1993, we restricted the sample to those alive in 1993 and who would be younger than 15 by the end of the period (2000).

As mentioned previously, our anthropometric measure is child height. Using 1990 British growth charts, we have standardized height by age in years and sex. Because children in Indonesia fall well below this international average in height, we omit observations more than 5 standard deviations from the Indonesian mean, rather than the British mean as is typically done in standard software packages. This accommodation ensures that the distribution of height is in fact approximately normally distributed at the beginning of our sample in 1993. Another issue with this data is measurement error. To limit bias in this regard, we have chosen to also omit observations if the change in z-scores between periods exceeds 4 standard deviations.

Particularly relevant to this research is the IFLS's inclusion of community-level data on the availability of microfinance institutions. As noted previously, we want to distinguish between the sizes of banks within various communities. We define the large banks (LARGEMFI) to be the Bank Rakyat Indonesia (BRI) and People's Credit Bank (BPR). All other institutions are defined as small banks (SMALLMFI). Definitions for all variables are summarized in Table A.1 of the Appendix. Table 2 summarizes the changes in the proportion of children that lived in communities with MFIs across our sample period. For illustration, we have separated them into two samples: children who lived in communities that had MFIs in 1993 and those that did not. Changes in the presence of MFIs do not appear to be driven solely by the financial crisis. Interestingly, most of the movement in or out of these communities happened well before the financial crisis rather than as a result thereof.

<TABLE 2 here>

Looking at the children living in communities that had no MFIs in 1993, we see that nearly 35 percent had acquired MFIs by 1997. Almost all of this increase came from smaller MFIs. This is consistent with expectations due to the fact that smaller MFIs like BKD cater to poorer populations and are often the first credit institution to move into previously un-served communities. Following the financial crisis that began in 1997, there was a decline in the percentage of children who lived in communities with MFIs. Overall, over 23 percent of these children who lived in communities that previously had no MFIs in 1993 had gained MFIs by 2000. Again, most of these came in the form of small MFIs.

This story differs when we look at the sample of children living in communities that had MFIs in 1993. Nearly one quarter of these children were living in communities that had lost MFIs even before the financial crisis in 1997. After the crisis, these communities again lost

MFIs, but at a slower rate than prior to 1997. As with the communities that did not have MFI access in 1993, the changes in MFIs are mostly due to the exodus of smaller MFIs, though a number of large MFIs also left their respective communities between 1993 and 2000.

Summary statistics for the remaining variables in the model are reported in Tables 3-4. Table 3 shows statistics from the pooled sample, while Table 4 reports the same statistics depending on whether the community did or did not have an MFI in 1993. The first thing to note in Table 3 is that Indonesian children began the period well-below their peers internationally in terms of height. On average, Indonesian children were 1.2 standards deviations below average in terms of height for age and sex. Not surprisingly, given the dramatic financial upheaval that started in 1997, these children lost ground. On average, these children lost 0.20 more standard deviations in height relative to other children in each of the two sub-periods (1993-97, 1997-2000). Part of this surely is related to the drop in real food consumption. On average, Indonesian children consumed 5 percent less food per child in each period, over 10 percent from 1993 to 2000. Despite the crisis, however, most other indicators of community economic development increased on average, even if only slightly. The only notable decline was in the number of communities with medical posts.

<TABLE 3 here>

There are notable differences between the communities that had MFIs in 1993 and those that did not. Due to the fact that one of the primary functions of microfinance is to spur economic development, it is not surprising that those communities with MFIs in 1993 were wealthier and better-developed than their counterparts with no MFIs in 1993 (see Table 4). Those living in communities with MFIs were more than twice as likely to live in urban areas, have regular garbage collection and a sewage system. They also had better access to medical

facilities, electricity, and had more non-agricultural industries (factories and cottage industries). Not surprisingly, the children were also taller in the communities that had MFIs. This is not, apparently, due to significantly better access to food, because the average household consumption per member (lnHHFOODPC) was virtually identical across both groups in 1993.

<TABLE 4 here>

The changes in household and community characteristics across the sample period differed as well. In communities without MFIs in 1993, children fell slightly further behind their international peers than did those in the more developed communities. Though average food consumption declined for both groups, those households in communities without MFIs in 1993 decreased food consumption by about 2 percent more per period than those in communities with MFIs. Most of the other changes were similar across the groups. Two notable exceptions were that those without MFIs in 1993 were more likely to gain cottage industries while those with MFIs were more likely to gain factories.

Overall, these data highlight some aspects that will inform our estimation of the model in the subsequent section. First and foremost, it shows that most of the variability in MFI access over the period is due to the entrance and exit of the smaller MFIs. As we discussed in section 2, these smaller MFIs have a much smaller average loan size and are more likely to cater to the poorest clients. The data also highlight the differences between those communities that originally had MFIs and those that did not. Those with MFIs in 1993 were clearly wealthier, more urban and better developed. Over the seven-year period, these wealthier communities lost many of their MFIs. On the contrary, the poorer communities (those without MFIs in 1993) gained MFIs, particularly small MFIs. Not surprisingly, they too experienced a decrease in MFIs from their peak in 1997 after the financial crisis that began in late 1997.

5. REGRESSION RESULTS

Model 1, the benchmark model, estimates equation 2 via instrumental variables. Due to the presence of heteroscedasticity, we use generalized method of moments (GMM). The benchmark model includes controls for changes in real household expenditures per person (ΔlnHHFOODPC). In all models, URBAN and ΔELECTRICITY are used as instruments for ΔSMALLMFI. First-stage regressions for each model estimated are reported in Tables A.2 and A.3 of the Appendix.

Models 2-5 then introduce, one-by-one, the potential confounding effects of changes in infrastructure that are assumed to affect child health outcomes directly. These possible confounding regressors include ΔPOSYANDU, ΔMEDPOST, ΔSEWAGE, ΔFACTORY, and ΔCOTTAGE. Like changes in MFIs, these factors could, themselves, be endogenous for similar reasons. To test this possibility, a Hausman test was performed for each of these confounding variables, with the results given in Table A.3 in the Appendix. The null that the confounding factor is exogenous could not be rejected in any case. However, some caution should be noted as the evidence indicates that these confounding factors are only weakly identified. Nevertheless, for the final results reported in Table 5, only the change in small MFIs is instrumented. All other regressors are assumed exogenous.

Given that the results are critically dependent on the instruments, it is important to examine their validity. For the six models reported in Table 5, the first stage is reported in Table A.3 in the Appendix. In Table A.3 we report the Kleibergen-Paap *rk* test for weak identification based on size, the Kleibergen-Paap Wald test for under-identification and the Hansen *J* test for

over-identification. These tests confirm the general validity of the instruments. The instruments indentify the endogenous regressor, the change in small MFIs, and indicate any potential bias in the estimates is reasonably small. Moreover, the first-stage *F*-statistics satisfy the Staiger-Stock standard for sufficiently strong instruments ($F>10$) for all alternatives except model 5.

As important as the econometric tests are to establishing instrument validity is whether the first-stage results are consistent with theory. The results in Table A.3 confirm that the instruments do have the expected effects on the change in small MFIs across communities. Urbanization positively and significantly affects the probability that a small MFI enters (or remains in) the market, with the probability a small MFI enters (or remains in) an urban community being roughly 0.06 higher than in rural communities. Also as expected, an increase in the rate of electrification raises the probability that small MFIs enter (or remain) in the community.

Not surprisingly, the inclusion of the other indicators of community-level economic development is typically correlated with the presence of small MFIs. In particular, increases in the number of *posyandu*, factories, and cottage industries are all associated with the entrance of new smaller MFIs into a community. Arguably, the establishment of factories and cottage industries may be due to the availability of microfinance rather than the reverse. However, because we want to confidently pinpoint whether the presence of small MFIs in and of themselves affects child health, we are willing to assume these are exogenous to changes in the presence of MFIs.

Having established the validity of the instruments used to predict the presence of small MFIs, we can turn our attention to the determinants of child growth in Table 5. The main controls exhibited expected signs and were significant in all specifications. Changes in real

household food expenditures per person had a positive, but small, effect on children's growth. The dummy for whether the child was originally below the Indonesian median for height for his age and sex is positive and significant in all specifications. The constant, however, is negative and significant. This implies that for those beginning above their age-sex median, they fell one-half a standard deviation further below their peers internationally. However, those children initially below the median, all else equal, held their ground relative to international standards. This is consistent with reversion to the mean within this sample of Indonesian children.

<TABLE 5 here>

Finally, the results with respect to the presence of small MFIs are strong and revealing. Children in communities that gained or maintained access to these MFIs gained roughly one standard deviation in height relative to international standards. Of course, roughly as many children lost access to small MFIs over these periods than gained it. For them, the loss of these institutions in their local community had devastating effects.

6. DISCUSSION

So what can we infer about the effect of small MFIs on child health? Recall the four theoretical explanations for why the presence of MFIs might affect child health. Smaller MFIs could: (1) facilitate the acquisition of parents' (especially mothers') social capital, thereby increasing parents' knowledge of nutrition and other health concerns; (2) increase the bargaining power of women, leading to a shifting of household resources towards expenditures that improve the well-being of the children; (3) encourage broad economic growth, resulting in improvements in community infrastructure like sanitation and healthcare; or (4) provide households with the ability to smooth consumption in the wake of shocks to wealth and income. While it is difficult

to disentangle these effects, it appears some explanations are more consistent with the evidence than others.

First, small MFIs appear to affect child health through avenues independent of broader economic development. The justification for this inference relies on the fact that we have attempted to control for changes in important infrastructures in the regression models. The only indicator of broader economic development that was significant was the presence of factories, and it was negative. Perhaps since we controlled for household expenditures on food separately, any positive effect from factories may have been accounted for through the consumption effect. Still the negative effect is curious. Perhaps the presence of factories increased pollution or child labor. Possibly, however, the story is less nefarious. Recall that these indicators were weakly indentified when treated as endogenous. Perhaps the lack of significance of any of these factors is a function of endogeneity and weak identification. This is an avenue worth pursuing in future work. Still, it is worth noting that while all these other covariates were weakly identified, the presence of small MFIs was not. Overall, this provides evidence that the large effect we find is truly related to the presence of small MFIs and not merely correlated with other indicators of economic development.

Second, because we directly controlled for real household expenditures, it also appears that the large effect attributed to the change in access to smaller MFIs is not due to consumption smoothing. For example, if the loss of small MFIs caused a significant loss of access to credit, this should have been seen through the estimated effect of household food expenditures on the change in height. Given the relatively small effect of expenditures on child growth, it would appear that the biggest effect of these small MFIs comes independently of consumption.

To the contrary, it is possible that there are unaccounted for changes in the allocation of these food resources. If the presence of smaller MFIs has raised the bargaining power of women, it is possible that the children are now receiving a relatively larger share of the limited food resources than they did previously (even holding total food expenditures per person constant). All else equal, this could explain at least part of the increase in height. Furthermore, the loss of MFIs would also mean a loss of bargaining power for women in the household. So it is entirely plausible that losses would result in a deterioration of children's health.

Finally, it is also possible that the entrance and exit of smaller MFIs during this period have affected child height through the creation and destruction of social capital. As MFIs enter the community, social capital is created along with economic growth, access to credit, and increased economic power for women. The loss of MFIs carries the potential to decrease social capital due to the fact that residents have one less formal organization in which to belong. Recent evidence by Nobles and Frankenberg (2009) supports this explanation as they found that a mother's participation in formal community organizations has a significant, positive effect on her children's health. What is unknown is the extent to which a loss in small MFIs might also be correlated with the loss of other venues for community participation and engagement. This suggests another potentially fruitful area for future investigation.

7. CONCLUSION

While other researchers have speculated about the possible impact of microfinance on child health outcomes, this paper is the first to our knowledge to investigate the hypothesis. Ultimately, the data strongly support this link. The presence of microfinance institutions in

communities has a large and positive effect on relative changes in children's health. Sorting out this relationship, however, is not without its challenges.

The largest of these has to do with endogeneity. While we are able to deal with the household-level endogeneity by using community-level access rather than using whether or not the household had borrowed money during the period, the entrance of such institutions into new communities is in-and-of-itself endogenous. Ideally the entrance of MFIs into previously un-served communities would be administered by randomized experiments. This is simply not realistic for anything but small-scale programs and studies. Fortunately, however, satisfactory instruments exist in the IFLS that allow us to deal with this problem.

The second challenge is to identify the means through which the presence of MFIs affects child health. Theoretically, MFIs can affect child health by: (1) providing a powerful mechanism through which parents can increase their social capital and support the spread of health-related knowledge; (2) increasing the bargaining power of women so that resources are shifted towards expenditure that most benefit children; (3) promoting broad-based community economic development; and (4) providing a way for families to smooth consumption in response to income shocks. Because we are able to control for changes in real household food consumption expenditures per person and other indicators of economic development, it appears that the large, positive effect of the new entrance of smaller MFIs in communities on children's health is due to increases in the bargaining power of women and/or the development of social capital. However, this does not imply that MFIs do not also help smooth consumption or promote economic development. Rather, it implies that MFIs are able to affect child health through these other mechanisms and that the effect is potentially large. While these results are indicative of the

importance of the presence of MFIs on the welfare of children, the precise nature of this mechanism warrants further analysis.

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9. APPENDIX

Table A.1: IFLS Codes and Definitions

Variable	Data Source IFLS year: book:varname	Description
HEIGHT	93:BUKCCA2: C10 97:BUS_1: US04 00:CBUS2_1: US04	Height in centimeters
AGE	93:BUKKAR2:AR09YR 97,00:BK_AR1:AR09	Age in 2000 (years)
SEX	93:BUKKAR2:AR07 97,00:BK_AR1:AR07	Biological sex (male = 1)
HHFOODPC	XFOOD/HHSIZE	Household expenditures on food per person
XFOOD	93:PCE93NOM: XFOODTOT 97:PCE97NOM: XFOOD 00:PCE: XFOOD	Total monthly household expenditures on food
HHSIZE	93:PCE93NOM: HHSIZE 97:PCE97NOM: HHSIZE 00:PCE: HHSIZE	Number of persons in household
URBAN	93:BKIILK1:CLK05 97,00:BK1:LK05	Village type is urban (not rural)
FACTORY	93:BUKID03: D30 97,00:BK1_D4: D30a	Presence of a factory in the village
COTTAGE	93:BUKID05: D32 97,00:BK1: D32	Presence of a cottage industries in the village
SEWAGE	93:BUKI_CF: BC13 97,00:BK1: C13	Presence of a sewer system in the village
GARBAGE	93:BUKI_CF: BC19a 97,00:BK1: C19a	Village has regular garbage collection
MEDPOST	93:BUKI_CF: BJ11 97,00:BK1: J11	Presence of a medical post in the village
POSYANDU	93:BUKI_CF: BJ20 97,00:BK1: J20	Number of *posyandu* in the village
ELECTRICITY	93:BUKIB01: BH1a 97,00:BK1: B1a	Percent of households that use electricity
MFI	93:BUKIG01:BG1, 97,00:BG2_C2 BK1:G3a	Presence of MFI in community
LARGEMFI	93:BUKIG01:BG1, 97,00:BG2_C2 BK1:G3a	Presence of large MFI in community. Large MFIs=BRI, BPR
SMALLMFI	93:BUKIG01:BG1, 97,00:BG2_C2 BK1:G3a	Presence of small MFI in community. Small MFIs=LKD, LDKP, KUD, FC, PB

Notes:
Abbreviations: BRI=Bank Rakyat Indonesia, BPR=People Credit Bank, LKD=Village Credit Institution, LDKP=Village Unit Cooperative, KUD=Village Unit Cooperative, FC=Other Formal Cooperative, PB=Private Bank.

Table A.2: First Stage Results for Models with Additional Regressors Endogenous

Models	2	3	4	5	6
	ΔSMALLMFI	**ΔSMALLMFI**	**ΔSMALLMFI**	**ΔSMALLMFI**	**ΔSMALLMFI**
	Coeff	**Coeff**	**Coeff**	**Coeff**	**Coeff**
	(st err)	**(st err)**	**(st err)**	**(st err)**	**(st err)**
URBAN	0.057**	0.063***	0.057**	0.057**	0.057**
(Yes/No)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
ΔELECTRICITY	-0.017***	-0.018***	-0.017***	-0.017***	-0.017***
(Percent/10)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
ΔGARBAGE		0.015	0.016	0.016	0.016
(Yes/No)		(0.048)	(0.048)	(0.048)	(0.048)
ΔMEDPOST	0.010				
(Yes/No)	(0.022)				
ΔPOSYANDU		0.014***			
(Number)		(0.005)			
ΔlnHHFOODPC	-0.020	-0.019	-0.020	-0.020	-0.020
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Z<Mean in 1993	0.012	0.012	0.122	0.122	0.122
(Yes/No)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
CONSTANT	-0.020	-0.022	-0.021	-0.021	-0.021
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Hausman Test	*0.043*	*5.597***	*4.499***	*5.979***	*6.026***
	ΔPOSYANDU	**ΔMEDPOST**	**ΔSEWAGE**	**ΔFACTORY**	**ΔCOTTAGE**
URBAN	-0.392***	0.008	0.005	0.016	-0.085***
(Yes/No)	(0.119)	(0.020)	(0.024)	(0.021)	(0.022)
ΔELECTRICITY	0.110***	0.021***	-0.027***	-0.020***	-0.010*
(Percent/10)	(0.017)	(0.005)	(0.006)	(0.004)	(0.006)
ΔGARBAGE		0.112***	0.102**	0.149***	0.084**
(Yes/No)		(0.033)	(0.049)	(0.026)	(0.033)
ΔMEDPOST	-0.616***				
(Yes/No)	(0.091)				
ΔPOSYANDU		-0.020***			
(Number)		(0.004)			
ΔlnHHFOODPC	-0.072	-0.027**	-0.048***	-0.029**	0.040**
	(0.063)	(0.013)	(0.017)	(0.014)	(0.018)
Z<Mean in 1993	-0.056	0.027	0.001	-0.015	0.025
(Yes/No)	(0.090)	(0.018)	(0.024)	(0.020)	(0.025)
CONSTANT	0.051	-0.061***	0.040*	0.064***	0.093***
	(0.073)	(0.017)	(0.023)	(0.018)	(0.021)
Hausman Test	*0.158*	*0.634*	*0.350*	*0.001*	*0.259*
rk F	*2.43*	*3.09*	*1.60*	*2.87*	*5.87*
rk Wald	*7.31***	*12.37****	*4.81**	*8.61***	*17.64****

Notes:

, and *** denote significance at the .10., .05 and .01 levels, respectively.*

rk F statistic is the Kleibergen-Paap test for weak identification

rk Wald statistic is the Kleibergen-Paap test for under-identification

Table A.3: First Stage Results for Models with Additional Regressors Assumed Exogenous

Models	1	2	3	4	5	6
Endogenous			**ΔSMALLMFI**			
	Coeff (st err)	**Coeff (st err)**	**Coeff (st err)**	**Coeff (st err)**	**Coeff (st err)**	**Coeff (st err)**
URBAN	0.057***	0.063***	0.057**	0.057**	0.055**	0.063***
(Yes/No)	(0.023)	(0.023)	(0.023)	(0.023)	(0.022)	(0.023)
ΔELECTRICITY	-0.017***	-0.018***	-0.017***	-0.017***	-0.014***	-0.016***
(Percent/10)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
ΔPOSYANDU		0.014***				
(number)		(0.005)				
ΔMEDPOST			0.010			
(Yes/No)			(0.022)			
ΔSEWAGE				0.002		
(Yes/No)				(0.018)		
ΔFACTORY					0.166**	
(Yes/No)					(0.017)	
ΔCOTTAGE						0.070***
(Yes/No)						(0.018)
ΔlnHHFOODPC	-0.020	-0.020	-0.020	-0.020	-0.015	-0.023
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Z<Mean in 1993	0.012	0.012	0.012	0.012	0.015	0.010
(Yes/No)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
CONSTANT	-0.021	-0.022	-0.020	-0.021	-0.031	-0.027
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
rk F	*12.01##*	*14.64##*	*12.03##*	*12.00##*	*9.05#*	*11.90##*
rk Wald	*24.05****	*29.33****	*24.11****	*24.03****	*18.14****	*23.83****
J	*0.296*	*0.290*	*0.262*	*0.251*	*0.088*	*0.179*
Hausman Test	*8.482****	*8.642****	*8.840****	*8.892****	*9.701****	*10.674****

Notes:
, and *** denote significance at the .10., .05 and .01 levels, respectively.*
 # and ## indicate 15 and 20 percent maximal IV size (Stock and Yogo 2005)
rk Wald statistic is the Kleibergen-Paap test for under-identification
rk F statistic is the Kleibergen-Paap test for weak identification
J test is the Hansen test for over-identification

10. NOTES

[1] For example, see Thomas and Strauss (1992), Thomas, Strauss and Henriques (1991), Sahn (1994), and Thomas, Lavy, and Strauss (1996).

[2] See Gertler and Gruber (2002) on consumption smoothing in response to illness in Indonesia.

[3] For example, in the wake of the financial crisis and criticism from the IMF, Suharto's government enacted austerity measures, cutting funding to public services and decreasing subsidies. At the same time, prices rose on necessities like rice and heating fuel, as well as education.

[4] There are, of course, numerous informal arrangements, most notably, the traditional *arisan.* In some cases, the *arisan* (women's lottery game) can act as a revolving savings and credit association (ROSCA). In these cases, the ROSCA will perform many of the tasks that more formal MFIs undertake. However, the typical amount of money in these games is much smaller than the average loans from either large or smaller MFIs.

[5] Commercial approach includes: "1) Adoption of a for-profit orientation in administration and operation, 2) Progression toward operational and financial self-sufficiency and 3) Operation as a for-profit, formal financial institution subject to prudential regulation and supervision" (Charitoneko, Afwan 2003).

[6] These include loans for daily living expenses, education, medication, and household goods.

[7] There are numerous ways in which mother's education can affects children's nutritional status. These include preferences, decisions about health inputs, and income effects (Schultz 1984). Some also argue that women with more education are more likely to adopt new knowledge about health and nutritional practices (Glewwe 1999). Of course, households with more highly educated mothers tend to have higher incomes which lead directly to improved nutrition for

children. See Miller and Rodgers (2009) for a recent overview of these and related effects on child health.

[8] The results of a Hausman test confirm that this dummy variable can be treated as exogenous in the regression.

[9] Winnings from *arisan* activity could also affect child nutrition by providing extra spending money for food and other household items. These winnings are included in household income. For our purposes, any positive effect from *arisan* winnings will be captured by an increase in total household expenditures.

[10] These are mobile health clinics sponsored by the Indonesian government that are designed to promote child health.

[11] The instrument used in this process is whether or not the village had regular garbage collection. Garbage collection is correlated with other broad improvements like access to medical care and the presence of sewers. While the lack of centralized garbage collection could certainly adversely affect health if it breeds disease, this effect is assumed to be far less strong and direct than that of sewage systems or the presence of medical operations.

Table 1: General Classification of MFIs in Indonesia

	Formal MFIs	Semi-formal MFIs
Characteristics	- Adopt a commercial approach - Attain large-scale outreach - Have high degree of financial self-sufficiency - Relatively even performance	- Not adopt a commercial approach - Village/sub-district outreach - Have low degree of financial self-sufficiency - Uneven performance
Examples	- BRI Units - BDB - PP - BPR	- Cooperatives and credit unions o KSP, USP - BKD - LDKP
Outstanding Loans	No.= 9,930,054 % market= 82.5 Rp billion= 17,673 % market=78.1	No.= 2,109,871 % market= 17.5 Rp billion=4,967 % market=21.9
Total Deposits	No.= 32,482,146 % market= 93.1 Rp billion= 27,778 % market=93.7	No.=2,393,744 % market= 6.9 Rp billion=1,871 % market=6.3

Notes:
Constructed from Charitoneko and Afwan (2003) Table 2.2 Total Microfinance Supply.
BRI Units = Bank Rakyat Indonesia Micro Business Division (only MFI with national coverage); BDB= Bank Dagang Bali; PP= Perum Pegadaian; BPR= Bank Perkreditan Rakyat; BKD= Badan Kredit Desa; LDKP= Lembaga Dana Kredit Pedesaan; KSP= Koperasi Simpan Pinjam; USP= Unit Simpan Pinjam.

BDB: All figures reflect self-reported data as of end-2001. BRI Units: data are as of end-2001 and from BRI (2001, p.44); units include BRI Units (3,823) and Village Service Posts (PPDs) (240). BPRs: data are as of 30 September 2002 from BI (2003). PP: data are as of end-2001; units refer to number of branches (BI 2001, p. 147); the total number of outstanding loans is based on 15.7 million customers served in 2001 (with an average loan maturity of 4 months); the total outstanding loan amount is from ADB (2003). LDKPs: estimates are for 30 June 2000 for 7 of 8 types of LDKPs as included in Holloh (2001, p. 34). BKDs: data are as of 31 July 2002, provided by the BRI Head Office; the number of units equals the active number of BKDs. Cooperatives: data are as of 30 April 1999 based on estimates presented in BI 2003 and ADB 2003. Credit Unions: data are as of end-2001, from ADB (2003).

Table 2: Proportion of Children living in Communities with MFIs by Size

Variable	Year	Proportion
without MFIs in 1993		
MFI	1993	0.000
	1997	0.345
	2000	0.234
SMALLMFI	1993	0.000
	1997	0.316
	2000	0.181
LARGEMFI	1993	0.000
	1997	0.051
	2000	0.070
With MFIs in 1993		
MFI	1993	1.000
	1997	0.755
	2000	0.732
SMALLMFI	1993	0.844
	1997	0.687
	2000	0.664
LARGEMFI	1993	0.406
	1997	0.318
	2000	0.280

Table 3: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Period Changes (n=3682)				
ΔZHEIGHT	-0.206	0.922	-3.989	3.853
ΔGARBAGE	0.012	0.247	-1.000	1.000
ΔMEDPOST	-0.022	0.444	-1.000	1.000
ΔPOSYANDU	0.048	2.672	-25.000	11.000
ΔELECTRICITY	12.143	22.245	-50.000	100.000
ΔSEWAGE	0.004	0.606	-1.000	1.000
ΔFACTORY	0.003	0.531	-1.000	1.000
ΔCOTTAGE	0.045	0.582	-1.000	1.000
ΔlnHHFOODPC	-0.054	0.682	-3.591	2.627
Levels in 1993 (n = 1825)				
ZHEIGHT in 1993	-1.214	1.479	-6.061	3.634
URBAN in 1993	0.385	0.487	0.000	1.000
GARBAGE in 1993	0.319	0.466	0.000	1.000
MEDPOST in 1993	0.135	0.341	0.000	1.000
POSYANDU in 1993	6.858	6.927	1.000	63.000
ELECTRICITY in 1993	57.708	35.330	0.000	100.000
SEWAGE in 1993	0.504	0.500	0.000	1.000
FACTORY in 1993	0.253	0.435	0.000	1.000
COTTAGE in 1993	0.708	0.545	0.000	1.000
lnHHEXP in 1993	12.195	0.713	9.586	15.692

Table 4: Summary Statistics by MFI Presence in 1993

	No MFIs in 1993		MFIs in 1993	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
	Period Changes			
ΔZHEIGHT	-0.210	0.928	-0.204	0.917
ΔGARBAGE	0.016	0.251	0.009	0.291
ΔMEDPOST	-0.009	0.396	-0.033	0.476
ΔPOSYANDU	0.080	2.719	0.024	2.636
ΔELECTRICITY	14.133	23.221	10.615	21.346
ΔSEWAGE	0.021	0.624	-0.009	0.592
ΔFACTORY	0.006	0.533	0.050	0.528
ΔCOTTAGE	0.074	0.604	0.024	0.563
ΔlnHHFOODPC	-0.066	0.691	-0.046	0.674
	Levels in 1993			
ZHEIGHT in 1993	-1.309	1.467	-1.141	1.484
URBAN in 1993	0.217	0.413	0.515	0.500
GARBAGE in 1993	0.161	0.369	0.442	0.497
MEDPOST in 1993	0.105	0.307	0.158	0.365
POSYANDU in 1993	5.103	6.179	8.219	7.168
ELECTRICITY in 1993	46.226	36.599	66.610	31.577
SEWAGE in 1993	0.315	0.465	0.651	0.477
FACTORY in 1993	0.231	0.422	0.271	0.445
COTTAGE in 1993	0.575	0.495	0.811	0.391
lnHHFOODPC in 1993	12.215	0.678	12.179	0.739

Table 5: Instrumental Variables Estimation on ΔZHEIGHT (n=3682)

Model	**1**	**2**	**3**	**4**	**5**	**6**
Variable	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**	**Coeff**
(unit)	**(st err)**	**(st err)**	**(st err)**	**(st err)**	**(st err)**	**(st err)**
ΔSMALLMFI	0.912**	0.846**	0.925**	0.940**	1.161**	0.909**
(Yes/No)	(0.395)	(0.357)	(0.394)	(0.399)	(0.487)	(0.390)
ΔlnHHFOODPC	0.060**	0.058**	0.060**	0.059**	0.055*	0.062**
(real total per person)	(0.028)	(0.028)	(0.029)	(0.028)	(0.030)	(0.029)
ΔPOSYANDU		-0.011				
(number)		(0.008)				
ΔMEDPOST			0.024			
(Yes/No)			(0.047)			
ΔSEWAGE				-0.029		
(Yes/No)				(0.036)		
ΔFACTORY					-0.299***	
(Yes/No)					(0.091)	
ΔCOTTAGE						-0.063
(Yes/No)						(0.043)
Z<Mean in 1993	0.495***	0.496***	0.494***	0.495***	0.489***	0.497***
(Yes/No)	(0.041)	(0.041)	(0.042)	(0.042)	(0.044)	(0.042)
CONSTANT	-0.425***	-0.426***	-0.424***	-0.424***	-0.407***	-0.423***
	(0.032)	(0.031)	(0.032)	(0.032)	(0.035)	(0.032)
F	*49.03****	*37.95****	*36.84****	*36.39****	*34.53****	*36.83****

Notes:
, and *** denote significance at the .10., .05 and .01 levels, respectively.*
The first stage estimates for ΔSMALLMFI are reported in Column 1 of Table A.3.
In models 2-6, the additional explanatory variable is treated as exogenous.