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Microfinance Programs and Contraceptive Use:
Evidence from Indonesia

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Abstract

This study examines the relationship between microfinance programs and contraceptive use with data from the 1997 and 2000 waves of the Indonesia Family Life Survey. Community and individual fixed-effects models are used to control for nonrandom program placement and program participation selection bias. Given wide availability of contraceptive services at low costs in Indonesia, the hypothesized mechanism linking microfinance programs to contraceptive use is the desire to stop childbearing. I conclude that microfinance program availability is associated with increased contraceptive use, with a stronger effect at lower levels of community resources. The effect is also conditioned on desire for no more children. At the individual level, microfinance borrowing is not associated with increased contraceptive use at any level of household resources. Among women who report wanting no more children, microfinance borrowing is associated with lower odds of ever-use of contraception.

Introduction

The United Nations has declared 2005 the International Year of Microcredit (United Nations General Assembly, 2003), highlighting the critical role the development community expects microcredit and microfinance services to play in achieving the Millennium Development Goals (Daley-Harris, 2002; Littlefield, Murdoch, & Hashemi, 2003). Since its inception in Bangladesh thirty years ago, microfinance has been widely recognized as a powerful tool for alleviating poverty and improving health outcomes for the world's poorest communities, and particularly for women and children. Models for microfinance provision have proliferated around the world; many are women-focused and use group-lending techniques to minimize risk and to develop and leverage social capital among borrowers.

Results claimed by the microfinance sector are impressive. In addition to increased household income and improved risk management and consumption, health-specific outcomes of microfinance programs include improved status and empowerment of women within the household and community (S. Amin & Pebley, 1994; Hashemi, Schuler, & Riley, 1996; Schuler & Hashemi, 1994; Schuler, Hashemi, & Riley, 1997), improved child nutrition, health and survival (Bhuiya & Chowdhury, 2002; Bruce & Lloyd, 1995; Buzzard, 1995; Mknelly & Dunford, 1995; Smith, 2002), and increased rates of contraceptive use (Mknelly & Dunford, 1995; Schuler & Hashemi, 1994; Schuler et al., 1997; Steele, Amin, & Naved, 2001). Given the substantial financial resources devoted to microfinance services by governments and international development organizations, rigorous empirical studies of microfinance program impact are much needed but sorely lacking (Kurmanalieva, Montgomery, & Weiss, 2003).

In this study I take up the debate on the causal connections between microfinance programs and contraceptive use with data from the Indonesia Family Life Surveys from 1997

and 2000. I address some problems that persist in much of the empirical work on microfinance programs. The literature to date on microfinance and reproductive health outcomes suffers from several shortcomings. First, it is heavily concentrated on Bangladesh and the perhaps unique experience of the Grameen Bank system. Second, empirical models often fail to account for selection biases of microfinance program placement and individual participation. Third, while there is considerable theoretical debate about individual vs. community-level effects of microfinance programs, few studies model this rigorously. Fourth, there is a lack of clarity about the specific mechanisms by which microfinance programs affect contraceptive use and other health outcomes. Finally, few datasets allow for longitudinal views of program participation. I hope to address these drawbacks in this study.

Background

Microfinance Programs and Contraceptive Use

There is an extensive literature attempting to explain the mechanisms by which microfinance participation leads to improved health and demographic outcomes for women and their families generally, and specifically to increased contraceptive use and decreased fertility. One line of argument builds upon the New Home Economics, viewing increased access to credit as an input for women's self employment that in turn increases the value of their market time and the opportunity cost for childbearing. In economies where children provide productive labor to family enterprises or provide household labor that enables women to allocate more time to income generation, increased credit access may actually increase the demand for children. Similarly, if children are considered a normal good, then increased income will increase the demand for children (Pitt, Khandker, McKernan, & Latif, 1999).

Other proposed pathways focus on the role of empowerment, or the ways in which women gain control over economic resources and the agency to allocate those resources for family welfare. Participation in a microfinance program is hypothesized to increase empowerment in at least three ways: by placing more financial resources in women's hands, by increasing women's bargaining power within the household as a result of increased financial contributions, and by building solidarity, self-esteem and self-efficacy through group activities with other women. These forms of empowerment, in turn, reduce barriers to accessing family planning services, including financial constraints, restrictions on mobility outside the household, lack of information about contraception, and opposition from husbands (S. Amin & Pebley, 1994; Hashemi et al., 1996; Schuler & Hashemi, 1994; Schuler et al., 1997; Steele et al., 2001). However, contrary to their hypotheses, Schuler et al. (1997) found that credit programs and increased empowerment operated independently on likelihood of contraceptive use. This particular pathway (from credit programs through empowerment to contraceptive use) presupposes that women prefer small families and are eager to adopt contraception but are not able to achieve these preferences until "empowered" by microfinance programs; there is not consistent evidence in the literature to support this assumption, particularly outside of South Asia.

A third mechanism by which microfinance programs increase contraceptive use is social learning and social influence. Social influence is a diffusion model in which interpersonal interactions in social contexts change individuals' preferences; social learning is a closely-related concept in which interpersonal or impersonal interactions provide information that changes an individual's decision-making process (Montgomery & Casterline, 1996). Group-based programs may increase the demand for contraception through diffusion of the perceived advantages of a

small family norm and shared strategies for achieving desired family size (Madhavan, Adams, & Simon, 2003; Steele et al., 2001). Women in communities where microfinance program participation is high may receive “spillover” effects from programs (even when they do not participate themselves) through the interactions with members and through changing community norms for contraceptive use.

Of course, these three proposed pathways are not mutually exclusive. Social interactions in credit groups may change perceptions about the costs and benefits of children, which may then change the decision to contracept. Similarly, empowerment may be a cause or an outcome of social learning in savings and credit groups, or of the calculations behind the economic arguments for contraceptive use.

Contraceptive Use in Indonesia

An analysis of the relationship between microfinance programs and contraceptive use in Indonesia must be located in the context of the Indonesian family planning program and current patterns of contraceptive use. The 1997 Indonesia Demographic and Health Survey reported a contraceptive prevalence rate of 57 percent for currently married women. The most common methods are injectables (21 percent of all married women), pills (15 percent), and IUDs (eight percent). Sterilization rates in Indonesia are low relative to the overall contraceptive prevalence rates, with fewer than four percent of married women sterilized. Contraceptive histories from the DHS and other sources indicate that Indonesian women discontinue specific methods quite frequently and may use three or more methods over the reproductive span.

Indonesia’s government family planning program is well-known and much emulated in the developing world (Frankenberg, Sikoki, & Suriasrini, 2003; Gertler & Molyneaux, 1994;

Warwick, 1986). The National Family Planning Coordinating Board (or BKKBN as it is known in Indonesia) was established in 1970 with the goal of expanding access to contraceptive services, promoting continued use by acceptors, and institutionalizing the norms of family planning services use and small family size in Indonesia's diverse communities. Services are offered through government health centers, from village midwives and BKKBN family planning field workers, and at community health posts, family planning posts and commercial pharmacies. The BKKBN-supported methods include oral contraceptives, injectables, implants, IUDs, male and female sterilization, and condoms.

Financing of contraceptive services varies by method and by source. Most users pay at least a portion of the costs for contraceptives, particularly for pills and injectables. Clinic-based methods, including implants and IUDs, are more heavily subsidized. Since the late 1980s social marketing programs have encouraged contraceptive users to purchase supplies and services from the private sector or to pay small fees for government-subsidized methods. As of 1997, more than half of all contracepting women received supplies from private sources and fewer than 20 percent paid nothing for contraception (Frankenberg et al., 2003).

While the program is heavily supported and promoted at the national level, there is also considerable tailoring to local conditions and contexts, and provincial and local officials allocate resources and set targets accordingly (Gertler & Molyneaux, 1994; Warwick, 1986). The program was initially rolled out in Java and Bali, spreading to the rest of the country by 1980. Different program inputs and activities are matched to local needs, with areas of low prevalence targeted for more intensive field worker visits and communication programs to promote adoption. Programs in high prevalence areas emphasize continuation and broader family welfare issues, including income generation.

Since the establishment of the BKKBN, Indonesia's total fertility rate has fallen by 50 percent, from 5.6 in 1970 to 2.8 in 1997 (Frankenberg et al., 2003; Gertler & Molyneaux, 1994). While socioeconomic forces likely drove the desire for small families and the increased acceptance and use of contraceptive use among educated women, the supply and demand elements of the government program certainly contributed to the TFR decline (Gertler & Molyneaux, 1994). However, the decline in total fertility rate has not been accompanied by a commensurate drop in the maternal mortality ratio, which remains high relative to Indonesia's fertility level and stage of economic development. Promoting family planning services to delay first births and adequately space births remains a critical priority to improve maternal health (Beegle, Frankenberg, & Thomas, 2001).

The Microfinance Industry in Indonesia

Indonesia provides a compelling case study of microfinance programs. As of 2001, the microfinance sector supported 50,000 "units" or distinct posts or branches of specific programs, with a total of 12.0 million outstanding loans and 34.9 million savings deposits. The average outstanding loan amount in 2001 Rupiah was \$181; the average savings deposit was \$84 (Charitonenko & Afwan, 2003). For a country of 214 million people, this is a remarkable rate of participation. The largest player is the Bank Rakyat Indonesia's Micro Business Divisions, whose village branches are known as BRI Unit Desa, or BRI UD. With 2.8 million outstanding loans and 27.0 million depositors, BRI is not only Indonesia's largest microfinance institution, but the largest in the world.

One of the most common sources of short-term credit in Indonesia is pawning of household assets. The state-owned pawning company Perum Pegadaian (PP) had 5.2 million outstanding loans at the end of 2001, with an average loan amount of around Rp 259,000 or \$25.

PP served a total of 15.7 million clients in 2001, providing a very convenient, efficient, low-cost, and safe means of generating cash from household assets. The downfall of many formal financial institutions during Indonesia's financial crisis in 1997-1998 fueled significant growth in PP and other pawning institutions (Charitonenko & Afwan, 2003).

Other credit providers include the Badan Kredit Desas (BKD), or village-owned credit organizations, and the Bank Perkreditan Rakyat (BPR), or rural people's credit banks. Many employers, neighborhood groups and industry associations (e.g. military personnel) also offer credit cooperatives or credit unions.

Indonesia has a long and strong tradition of *arisan* or informal rotating credit clubs in which large portions of the population participate. As is true in many developing countries, much of the population also relies on moneylenders and on friends and family for credit. Despite the variety and coverage of microfinance institutions in Indonesia, there is still unmet demand for credit and savings services. Two recent surveys conducted by the Asian Development Bank and BRI found that half of sampled households had no savings account and 60 percent had no access to credit from a semiformal or formal financial institution; figures were similar for households with and without a viable commercial enterprise (Charitonenko & Afwan, 2003). The BRI survey also revealed that demand for savings services was much higher than for credit services. Households were reluctant to take on debt for a risky enterprise, but required financial vehicles to manage liquidity and to finance significant expenditures like education, weddings, and funerals. Women in particular were eager for safe, convenient ways to save that could be hidden from their husbands. These results point to an ongoing need for appropriate microfinance services and for continued evaluation of their efficacy.

Unlike many microfinance programs in South Asia, Africa and Latin America, Indonesia's microfinance programs are not primarily targeted at women. One exception is the Prosperous Family Program launched by President Suharto in 1996, and operated by the BKKBN. The Prosperous Family Program was initially designed to quickly address concerns about income inequality by providing easy access to subsidized savings and credit schemes to households that were not accessing commercial sources of credit. In the program's first year, almost 10 million families received funding, and the program continued to grow during and after the 1998 Indonesian financial crisis.

The Prosperous Family Program is notable for several reasons. The program was administered through the BKKBN's existing network of women's groups and contraceptive acceptor's groups, a significant departure from the bank-oriented microfinance sector in Indonesia. While motivated by a complex set of sociopolitical factors, the development and implementation of the program does suggest that the Indonesian government perceived a complementarity in promoting family welfare through both contraceptive services to encourage small family size, and improved household economic productivity through access to credit and savings.

Conceptual Framework and Hypotheses

The literature on microfinance and contraceptive use suggests several pathways through which microfinance programs might affect contraceptive use. These are mapped in Figure 1. Following Easterlin and Crimmins' (1985) framework for the determinants of contraceptive use, the figure shows costs of controlling fertility and demand for children as the proximate determinants. More distally, government family planning programs and household economic

opportunities may shape both contraceptive costs and desire for more children. Credit programs are hypothesized to affect desire for more children through the economic opportunities afforded by access to credit to build livelihoods; where price is a barrier to contracepting, borrowing may also directly reduce costs. Credit programs that emphasize empowerment may directly affect desire for more children and reduce the psychological costs to contracepting if other family members disapprove.

For the analysis of the Indonesian context, I focus on the bold pathways in Figure 1 for several reasons. I do not emphasize the financial, time and psychological costs of contracepting as these do not appear to be barriers to contraceptive use for most Indonesian women; nor do the majority of Indonesian microfinance programs do not include the “empowerment” components typical of South Asian microcredit schemes. Instead, I test BKKBN’s assumption that microfinance services, in conjunction with strong family planning programs, can change the preference for small families and therefore increase contraceptive use. Because microfinance services are targeted at households with fewer resources who would not normally access credit through commercial channels, I expect that the association between microfinance programs and contraceptive use will be stronger at lower levels of household and community resources.

Given that demand for children is the key determinant of contraceptive use in Indonesia (as opposed to financial costs and access), I also hypothesize that the desire for more children may condition the association between microfinance programs and contraceptive use. That is, the effect of availability of microfinance programs in the community or of individual borrowing on contraceptive use may vary depending on a woman’s underlying family size preferences.

More formally, then, my hypotheses are:

- H1: Microfinance program availability increases the odds that a woman will use contraception. The association is greater at lower levels of community resources.
- H2: The desire to stop childbearing conditions the association between microfinance program availability and contraceptive use.
- H3: Microfinance borrowing increases the odds that a woman will use contraception. The association is greater at lower levels of household resources.
- H4: The desire to stop childbearing conditions the association between microfinance borrowing and contraceptive use.

Analytic Approach

Both the contraceptive use and the microfinance program variables present measurement challenges. Contraceptive use, the outcome variable, can be captured in several ways including current use, ever use, cumulative use, spells of use, or proportion of time at risk spent using. These measures can also be method-specific or cover all methods. Surveys that capture contraceptive use data typically use contraception and pregnancy calendars and/or structured questions on current and ever use. Although the dataset used in this study includes contraceptive calendars with monthly use data, I use current and ever contraceptive use as the outcome variables. A review of Demographic and Health Surveys from six countries demonstrated close agreement between prevalence rates calculated from calendars and from current use questions (Steele & Curtis, 2003). In addition, the covariates of interest are not available at monthly intervals.

Measuring microfinance program availability and participation has also challenged researchers. Econometric approaches that parameterize demand for credit typically use amount borrowed as the relevant measure (Pitt et al., 1999). Studies emphasizing the empowerment and social influence aspects of microfinance programs are more interested in program participation, whether or not loans were accessed (R. Amin, Hill, & Li, 1995; Schuler et al., 1997; Steele et al., 2001). Network or spillover effects may also occur, with women receiving the benefits of microfinance programs without needing to join specific credit or savings groups. If these effects are present, then community-level program availability or level of participation in the community may be a more accurate measure than individual participation. In this study I use community availability of programs and borrowing from microfinance sources in separate models.

In addition to measurement challenges, there are also several potential sources of bias in these types of program evaluations. At the community level, it is reasonable to assume that microfinance programs are not randomly distributed across communities. If programs are targeted to areas with greater- or less-than-average levels of contraceptive use or female empowerment, then unobserved community characteristics will bias estimates of program effects (DeGraff, Bilsborrow, & Guilkey, 1997; Frankenberg & Thomas, 2001; Gertler & Molyneaux, 1994; Pitt et al., 1999). At the individual level, many program evaluations use choice-based samples, in which the probability of being a program participant in the sample is greater than the probability of being a program participant in the population. Another potential source of individual-level bias is self-selection into programs. If women who participate in microfinance programs are also the women most likely to use contraception, then program effects will be overestimated.

In the current study, choice-based sampling is not a concern (see data description below). However, community and individual selection biases are. To control for nonrandom program placement in communities, I employ a community-level fixed-effects model to test Hypotheses 1 and 2. This technique compares a woman's contraceptive use and the availability of microfinance programs in her community at two points in time. Formally, the equation for this model is:

$$\text{Cont}_{it} = \alpha + \beta x_{it} + \text{MF}_{tc} + Z_{tc} + \varepsilon_{it} + \mu_c$$

where Cont_{it} is current contraceptive use for woman i at time t , βx_{it} is a vector of individual variables for woman i at time t , MF_{tc} is the availability of microfinance programs at time t in community c , ε_{it} is the individual error term, and μ_c is the unobserved community-level effect. The fixed-effects estimator sweeps out of the model any community characteristics that remain constant within communities from Time 1 to Time 2 (Frankenberg & Thomas, 2001; Gertler & Molyneaux, 1994; Heckman & Robb, 1985; Khandker, 2003; Pitt et al., 1999). This fixed effects approach is computationally equivalent to adding a dummy variable for each community in the analysis. This community-level fixed-effects approach guarantees that any observed or unobserved characteristics of villages that may have determined the placement of microfinance programs and that did not change from 1997 to 2000 will not bias the estimates of the coefficients of the covariates (Wooldridge, 2003).

I control for individual selection bias in Hypotheses 1 and 2 by using an availability rather than a participation measure for microfinance programs. Therefore, I am testing whether the presence of a microfinance program in a village changes the odds of contraceptive use, rather than testing whether a woman's borrowing history with a credit program changes contraceptive use. For hypotheses 3 and 4 I use individual measures of program participation over time but

incorporate individual-level fixed effects to remove time-invariant characteristics of women that may be correlated with both program participation and contraceptive use.

Data and Methods

The data used in this study come from the 1997 and 2000 waves of the Indonesia Family Life Survey (IFLS), a panel survey fielded in 13 of Indonesia's 26 provinces that represents 83 percent of the Indonesian population. IFLS was first fielded in 1993 with a total of 7,224 households in 312 communities (Frankenberg & Karoly, 1995). In 1997, IFLS2 reinterviewed 94 percent of IFLS1 households and 91 percent of target respondents (Frankenberg & Thomas, 2000), including movers and "split-off" households. In 2000, IFLS3 reinterviewed 94 percent of original IFLS1 households plus 3,774 split-off households (Strauss et al., 2004).¹ IFLS includes detailed information at the individual level, particularly for ever-married women, and at the household and community level, including the existence of and levels of participation in various community groups including microfinance programs.

In this study I focus on currently married and fecund women ages 15-49 at the time of the survey. This sample includes 5,311 women in 1997 and 7,362 women from 2000. From this sample I must exclude two groups of women. First, I drop women who provide individual

¹The IFLS1 sampling scheme stratified on provinces, then randomly selected 321 enumeration areas within provinces using the representative sample frame employed by the 1993 SUSENAS, a major national socioeconomic survey. Urban enumeration areas and enumeration areas in smaller provinces were oversampled to facilitate residential and racial comparisons. Within enumeration areas, 7,730 households were randomly selected from 1993 SUSENAS listings, of which 7,224 were interviewed for IFLS1. IFLS2 reinterviewed 94 percent of these households, as well as 878 households to which an IFLS1 respondent had moved by 1997. IFLS3 reinterviewed 94 percent of IFLS1 households, plus 3,774 split-off households.

Within households, IFLS1 conducted interviews with selected members including the household head and spouse, two randomly selected children of the head and spouse under age 14, an individual over 50 and spouse, and, for a 25 percent random subsample of households, another individual age 15-40 and spouse. IFLS2 attempted to interview all current members of IFLS1 origin households, all 1993 respondents who had moved by 1997, and all IFLS1 household members born before 1968. IFLS3 expanded target criteria to include spouses and children of split-off

information but have moved to a non-IFLS community by 1997 or 2000, and therefore cannot be linked to community-level data. This group totals 502 in 1997 and 1,554 in 2000, and is significantly younger, better educated, less likely to currently use contraception, and has fewer children than the non-excluded respondents. Microfinance borrowing rates are not significantly different.

In addition, I exclude 878 women in 1997 and 1,157 women in 2000 who appear on the household roster for an IFLS household but who have left the household and are not tracked to a new household, and therefore do not provide detailed contraceptive use and borrowing information. The communities that these women have left are significantly more urban, more likely to have piped water, and have slightly fewer contraceptive methods available at local puskesmas. Availability of microfinance services is not significantly different across the groups. The resulting sample is 3,931 women in 1997 and 4,651 in 2000.

Individual level variables in the analysis include age and age squared, number of years of education, current and ever contraceptive use (coded 1 for use and 0 for no use), number of live children, and desire for no more children (coded 1 if the respondent reports wanting no more children and 0 if she reports wanting more children). I include the household's per capita expenditure in log form as a measure of household resources. In the analyses of microfinance borrowing, a dichotomous variable indicates whether the woman reported taking out a loan from one or more of a list of microfinance institutions in the past year. While not included in the regressions, the dataset also has dichotomous measures of knowledge of sources of credit in the community, and borrowing from any source besides friends and family in the last year.

household members, as well as basic information on non-target individuals. The analysis in this study adjusts for the IFLS sample design in three ways.

Community-level variables include province, urban versus rural residence, the community mean of logged per capita expenditure and a dichotomous variable indicating whether piped water is the main source of drinking water in the community. To control for family planning availability, I use two measures: the mean travel time to the nearest puskesmas, or health clinic, for members of the community, and the mean number of contraceptive methods offered by all the puskesmas serving the community. Microfinance program availability is dichotomous measure indicating whether there is at least one microfinance institution located within two kilometers of the village center.

Summary statistics for the sample are provided in Table 1, weighted to account for the IFLS sampling scheme. Sixty percent of the sample in both years are current contraceptive users. While microfinance program awareness and community availability are both high, borrowing is relatively uncommon. In Table 2 the sample is summarized by year and by borrowing status. Borrowers are older, better educated, and more likely to be current and ever contraceptive users. They have more children and are more likely to report wanting no more children. Their communities are better served by microfinance services.

The analysis proceeds with logistic regressions of the odds of current and ever contraceptive use. To test hypothesis 1, contraceptive use is estimated as a function of microfinance availability and all other covariates except desire for more children. I then include an interaction of microfinance availability with community resources. For hypothesis 2, I add first the desire for more children to see if the microfinance availability effect is attenuated, and then an interaction of program availability and desire for more children to see if the availability effect is conditioned by demand for children. These models all include community fixed effects. I repeat the sequence for hypotheses 3 and 4, replacing program availability at the community

level with individual borrowing, and replacing community resources with household resources. This set of models employs individual fixed effects.

Results and Discussion

Microfinance Program Availability and Contraceptive Use

Results from the first set of models linking microfinance program availability to current and ever use of contraception are presented in Tables 3 and 4 respectively. Model 3.1 shows no significant effect on current use of the presence of the KUKESRA program, but any program available within two kilometers increases odds of contraceptive use by 30 percent. Other significant covariates in this community-fixed effects model include age, education, number of living children, and household resources, with higher levels of resources reducing odds of contraceptive use. The community resources measure nears significance and increases odds of contracepting. In model 3.2, the interaction between program availability and community resources approaches significance and suggests that the effect of microfinance program availability on contraceptive use is stronger at lower levels of community resources.

In model 3.3 I add a zero-order term reflecting a woman's desire for no more children. Not surprisingly, this effect is highly significant and quite strong, more than doubling the odds of current use. However, the addition of this term does not attenuate the coefficients for the two measures of microfinance program availability, suggesting that changed demand for children is not the pathway through which access to credit programs might influence contraceptive use. In model 3.4 I test a different relationship between program availability and demand for children by interacting the terms. This interaction is significant for the presence of any microfinance program, although not for the KUKESRA program specifically. Model 3.4 implies that the desire

for no more children increases the odds of contracepting by 100 percent in communities without nearby sources of credit; however, in communities with nearby microfinance institutions, this effect is a 166 percent increase in odds. Recall that the community fixed effects specification has eliminated any fixed community characteristics that might predict program availability or contraceptive use. This suggests that women in communities with ready access to credit are better able to translate the preference for no more children into contracepting behavior.

In Table 4 I repeat the sequence of analysis with ever use of contraceptive as the dependent variable. For the most part the results are quite similar. Program availability is associated with a 45 percent increase in odds of ever using contraception, and this effect is conditioned by level of community resources as seen by the significant interaction in model 4.2. This effect translates into a 64 percent increase in odds of ever use for women in communities at the 25th percentile of per capita expenditure when credit programs are available, but only a 21 percent increase in odds for women in communities at the 75th percentile of per capita expenditure. In model 4.3, desire for no more children again does not attenuate the program availability effect. Model 4.4 confirms that the program availability effect is stronger among women who desire no more children, and the effect of desiring no more children on the odds of contraceptive use is higher among women in communities with nearby credit programs.

Borrowing and Contraceptive Use

I then turn to a set of analyses that predict contraceptive use as a function of individual borrowing from a microfinance program, employing individual fixed effects. Odds ratios for these models are shown in Table 5 for current use and Table 6 for ever use. Models 5.1 and 5.2 show no significant effect of borrowing on current contraceptive use, even when conditioned on resource level in the household. Model 5.3 shows a strong effect of desire for no more children

on contraceptive use but this does not attenuate the borrowing term, nor render it significant. Similarly, model 5.4 does not find significant interaction between borrowing and desire for no more children.

Results in Table 6 for ever-use of contraception as a function of borrowing are similarly non-significant with the exception of model 6.4. Here I find a strong and perhaps counterintuitive interactive effect between borrowing and desire for no more children. Among non-borrowers, desire for no more children increases odds of ever-use of contraception by a factor of three – a reasonable finding given the other models presented. However, among borrowers, desire for no more children *reduces* the odds of ever use by 90 percent. A fixed effects linear probability model of the same covariates (results not shown) confirms this result: The predicted adjusted probability of ever-use is higher for borrowers who desire more children (86%) than for borrowers who desire no more children (77%), holding all other covariates at their mean. Among those who desire no more children, predicted ever-use is slightly (but significantly) higher for non-borrowers (79%) than for borrowers (77%), again holding other covariates at their mean. For comparison, non-borrowers who want more children have a predicted probability of ever-use of 76%.

While the fixed effects specification has eliminated any unobserved heterogeneity across respondents that might predict borrowing, demand for children, and contraceptive use, it appears that this relationship is still a complicated one. One possible interpretation is that current desire for more children is shaped by an assessment of future economic prospects. Conditional on changes in household resources from 1997 to 2000, borrowers may have been more likely than non-borrowers to use contraception in the past to delay wanted births until more prosperous times.

Conclusion

The international development community has shown a keen interest in and enthusiastic support for microfinance programs in recent decades. With its emphasis on poverty alleviation, family welfare and women's empowerment, the practice of microfinance certainly offers considerable promise for improving the health and livelihood of many of the world's poor. Because of the substantial human and financial resources devoted to microfinance programs around the world, researchers, funders, and practitioners have an obligation to make sure that programs achieve their desired outcomes effectively and efficiently. This paper has attempted to add to the microfinance program evaluation literature in three key areas.

First, I extend the literature on microfinance programs and reproductive health outcomes from South Asia to Indonesia, a country with an extensive and diverse history of microfinance programs as well as rapidly changing contraceptive use patterns and significant government investment in family planning. Different gender dynamics, cultural influences, economic environments and program approaches to family planning and microfinance program interventions all contribute to a different dynamic linking credit and savings programs to reproductive health outcomes than has been found in Bangladesh and elsewhere. In this study I find a significant effect of microfinance program availability at the community level on contraceptive use, particularly in communities with lower levels of resources.

Second, I explore in detail one specific mechanism linking microfinance programs to contraceptive use. In doing so I find no compelling evidence that the effect of microfinance programs on contraceptive use, at least in Indonesia, operates via a reduced demand for more children. This is a departure from much of the microfinance evaluation literature that links participation to contraceptive use through empowerment, agency, and control over resources.

Given the findings here, future work should explore the social learning and diffusion processes by which a culture of borrowing to promote family welfare and prosperity might also spread a small family size norm.

Third, I emphasize the importance of accounting for selection bias at the individual and community level. One way this can be accomplished is through fixed-effect models for longitudinal data that include both program availability and program participation data. Without such controls, biased parameter estimates and standard errors lead to incorrect conclusions about the relationships between microfinance programs and various health and demographic outcomes.

Future studies in this area could capitalize more detailed contraceptive histories, data from more than two time periods, and more sophisticated measures of program participation, including amount of money borrowed, use of funds, and borrowing by other household members. Instrumental variables approaches also warrant attention. More explicit attention to Indonesia's 1998 financial crisis could yield measures of how households use microfinance services to cope with economic shocks in the context of family formation and household resource allocation strategies.

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Figure 1: Hypothesized Pathways from Microfinance Programs to Contraceptive Use

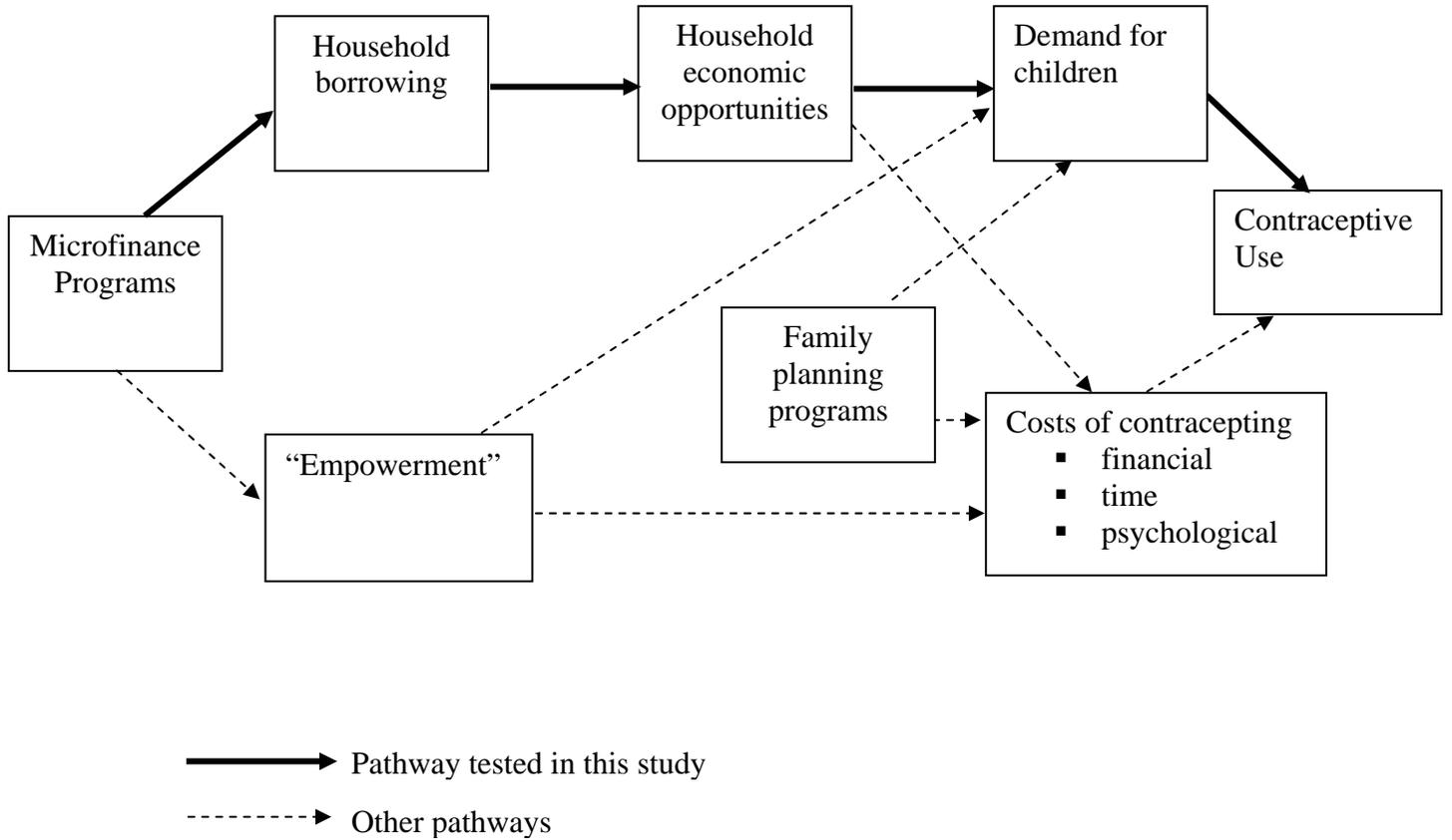


Table 1. Summary statistics, married Indonesian women 15-49, 1997-2000.

	1997		2000	
	Mean	Std. Dev.	Mean	Std. Dev.
<i>Individual characteristics</i>				
Age	31.14	7.276	32.73	7.958
Currently using contraception	0.60	0.490	0.60	0.489
Ever used contraception	0.78	0.412	0.79	0.404
Education (completed years)	6.18	3.906	6.59	3.929
Number of live children	2.29	1.468	2.31	1.564
Desires no more children	0.51	0.500	0.53	0.499
Knows of place to borrow money	0.67	0.469	0.69	0.461
Borrowed from any source (non friends and family) last year	0.12	0.331	0.12	0.327
Borrowed from microfinance program, last year	0.10	0.301	0.08	0.276
Household log (per capita expenditure)	4.39	0.801	4.45	0.739
<i>Community characteristics</i>				
Urban community	0.35	0.478	0.39	0.489
Community log(per capital expenditure)	4.53	0.455	5.23	0.350
Piped water most common source in community	0.23	0.422	0.25	0.435
Mean travel time to puskesmas (minutes)	15.41	9.573	15.19	8.918
Mean no. of contraceptive methods	10.44	2.673	10.69	2.875
At least one microfinance program within 2 km	0.69	0.461	0.63	0.482
KUKESRA program available in community	0.49	0.500	0.74	0.440
[DID I WEIGHT THESE DECRPTIVES?]				
N	3,931		4,651	

Table 2. Summary statistics by borrowing status and year, married Indonesian women 15-49, 1997-2000.

	1997				2000			
	Non-borrowers		Borrowers		Non-borrowers		Borrowers	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	30.86	7.286	33.60	6.710	32.46	8.013	35.73	6.625
Currently using contraception	0.59	0.492	0.69	0.463	0.59	0.491	0.72	0.450
Ever used contraception	0.77	0.420	0.88	0.323	0.79	0.410	0.89	0.314
Education (completed years)	5.97	3.803	8.07	4.298	6.40	3.840	8.71	4.269
Number of live children	2.27	1.475	2.50	1.381	2.29	1.577	2.52	1.390
Desires no more children	0.50	0.500	0.62	0.487	0.51	0.500	0.68	0.466
Knows of place to borrow money	0.64	0.481	1.00	-	0.67	0.472	1.00	-
Borrowed in last 12 months (non-friends, family)	0.03	0.162	1.00	-	0.04	0.202	1.00	-
Household log (per capita expenditure)	4.36	0.799	4.66	0.772	4.43	0.733	4.73	0.750
Urban	0.34	0.473	0.50	0.501	0.38	0.485	0.56	0.497
Community log(per capita expenditure)	4.51	0.458	4.68	0.396	5.22	0.350	5.33	0.340
Piped water most common source in community	0.23	0.420	0.26	0.438	0.25	0.434	0.28	0.449
Mean travel time to puskesmas (minutes)	15.62	9.798	13.54	6.995	15.42	9.050	12.72	6.832
Mean no. of contraceptive methods offered at	10.43	2.692	10.52	2.494	10.68	2.914	10.85	2.399
At least one microfinance program offered within 2 km	0.68	0.466	0.81	0.396	0.62	0.486	0.80	0.399
KUKESRA program available in community	0.49	0.500	0.52	0.500	0.73	0.444	0.80	0.399
N	3,510		421		4,298		353	

Table 3. Odds ratios for community fixed-effects models predicting current use of contraception from community availability of microfinance programs, married Indonesian women 15-49, 1997-2000.

	3.1	3.2	3.3	3.4
Age	1.108 [4.14]**	1.107 [4.12]**	1.104 [3.98]**	1.109 [4.16]**
Age ²	0.998 [5.60]**	0.998 [5.57]**	0.998 [6.12]**	0.998 [6.29]**
Education	1.043 [5.26]**	1.043 [5.28]**	1.045 [5.40]**	1.045 [5.45]**
Year	0.825 [1.35]	0.835 [1.27]	0.809 [1.47]	0.815 [1.42]
Number of living children	1.497 [17.39]**	1.498 [17.40]**	1.312 [10.90]**	1.313 [10.92]**
Household log (per capita expenditure)	0.919 [2.19]*	0.919 [2.19]*	0.935 [1.72]	0.934 [1.72]
Desires no more children			2.669 [15.09]**	2.005 [6.35]**
<i>Community characteristics</i>				
Community log (per capita expenditure)	1.457 [1.94]	1.629 [2.14]*	1.542 [2.19]*	1.528 [2.14]*
Piped water	1.041 [0.34]	1.033 [0.28]	1.05 [0.41]	1.046 [0.38]
Time to puskesmas	1.004 [0.49]	1.004 [0.46]	1.006 [0.67]	1.006 [0.71]
Number methods available	0.997 [0.21]	0.999 [0.08]	0.996 [0.30]	0.995 [0.35]
KUKESRA program in community	0.913 [1.12]	0.553 [0.88]	0.893 [1.38]	0.833 [1.94]
Microfinance programs available within 2 km	1.304 [2.69]**	5.098 [2.16]*	1.292 [2.56]*	1.138 [1.16]
<i>Interactions</i>				
KUKESRA * Inpce		1.112 [0.76]		
Microfinance programs available * Inpce		0.756 [1.83]		
KUKESRA * desires no more children				1.164 [1.46]
Microfinance programs available * desires no more children				1.33 [2.62]**
Observations	8575	8575	8575	8575
Number of individuals	309	309	309	309

Absolute value of z statistics in brackets

* significant at 5%; ** significant at 1%

Table 4. Odds ratios for community fixed-effects models predicting ever-use of contraception from community availability of microfinance programs, married Indonesian women 15-49, 1997-2000.

	4.1	4.2	4.3	4.4
Age	1.318 [9.42]**	1.317 [9.39]**	1.329 [9.70]**	1.331 [9.73]**
Age ²	0.995 [11.22]**	0.995 [11.19]**	0.995 [11.81]**	0.995 [11.83]**
Education	1.068 [6.55]**	1.069 [6.57]**	1.069 [6.60]**	1.07 [6.62]**
Year	0.914 [0.50]	0.938 [0.36]	0.896 [0.61]	0.905 [0.55]
Number of living children	2.061 [23.86]**	2.062 [23.87]**	1.877 [19.59]**	1.884 [19.65]**
Household lnpcce	1.028 [0.57]	1.027 [0.55]	1.044 [0.88]	1.043 [0.85]
Desires no more children			1.956 [8.00]**	1.493 [2.91]**
<i>Community characteristics</i>				
Community lnpcce	1.663 [2.09]*	2.168 [2.80]**	1.732 [2.24]*	1.702 [2.16]*
Piped water	1.278 [1.63]	1.248 [1.47]	1.294 [1.71]	1.28 [1.63]
Time to puskesmas	0.985 [1.54]	0.984 [1.66]	0.985 [1.47]	0.986 [1.43]
Number methods available	1 [0.01]	1.005 [0.27]	0.999 [0.03]	0.999 [0.06]
KUKESRA program in community	0.836 [1.71]	1.049 [0.06]	0.833 [1.73]	0.845 [1.46]
Microfinance programs available within 2 km	1.448 [3.05]**	10.98 [2.59]**	1.442 [3.00]**	1.224 [1.53]
<i>Interactions</i>				
KUKESRA * lnpcce		0.958 [0.24]		
Microfinance programs available * lnpcce		0.658 [2.21]*		
KUKESRA * desires no more children				0.952 [0.36]
Microfinance programs available * desires no more children				1.58 [3.32]**
Observations	8348	8348	8348	8348
Number of individuals	297	297	297	297

Absolute value of z statistics in brackets

* significant at 5%; ** significant at 1%

Table 5. Odds ratios for individual fixed-effects models predicting current use of contraception from microfinance program borrowing, married Indonesian women 15-49, 1997-2000.

	5.1	5.2	5.3	5.4
Age	1.457 [3.12]**	1.459 [3.12]**	1.475 [3.15]**	1.477 [3.16]**
Age ²	0.994 [3.31]**	0.994 [3.32]**	0.994 [3.45]**	0.994 [3.47]**
Education	0.947 [1.14]	0.946 [1.15]	0.958 [0.87]	0.959 [0.85]
Year	0.856 [0.59]	0.861 [0.57]	0.9 [0.39]	0.907 [0.36]
Number of living children	0.881 [1.13]	0.883 [1.11]	0.706 [2.87]**	0.709 [2.83]**
Household lnpcce	0.761 [2.47]*	0.766 [2.37]*	0.803 [1.94]	0.806 [1.90]
Borrowed from MFI in last 12 months	1.359 [1.57]	2.19 [0.64]	1.379 [1.59]	1.175 [0.59]
Desires no more children			3.264 [6.92]**	3.144 [6.51]**
<i>Community characteristics</i>				
Community lnpcce	1.448 [1.21]	1.438 [1.18]	1.318 [0.88]	1.308 [0.86]
Piped water	1.058 [0.32]	1.061 [0.33]	0.985 [0.08]	0.983 [0.09]
Time to puskesmas	1.003 [0.26]	1.003 [0.25]	1.008 [0.69]	1.008 [0.69]
Number methods available	0.999 [0.02]	1.000 [0.02]	0.991 [0.39]	0.993 [0.33]
<i>Interactions</i>				
MFI borrowing * lnpcce		0.902 [0.39]		
MFI borrowing * desires no more children				1.371 [0.85]
Observations	1736	1736	1736	1736
Number of individuals	868	868	868	868

Absolute value of z statistics in brackets

* significant at 5%; ** significant at 1%

Table 6. Odds ratios for individual fixed-effects models predicting ever use of contraception from microfinance program borrowing, married Indonesian women 15-49, 1997-2000.

	6.1	6.2	6.3	6.4
Age	3.328 [4.89]**	3.362 [4.89]**	3.29 [4.87]**	3.508 [4.93]**
Age ²	0.98 [5.82]**	0.98 [5.79]**	0.98 [5.83]**	0.979 [5.88]**
Education	0.962 [0.45]	0.952 [0.57]	0.966 [0.40]	0.978 [0.26]
Year	2.14 [1.43]	2.077 [1.37]	2.106 [1.40]	2.296 [1.59]
Number of living children	1.396 [1.29]	1.462 [1.45]	1.265 [0.88]	1.217 [0.71]
Household lnpcce	0.778 [1.19]	0.712 [1.53]	0.754 [1.33]	0.738 [1.37]
Borrowed from MFI in last 12 months	1.601 [1.02]	0.024 [1.43]	1.650 [1.07]	9.684 [3.16]**
Desires no more children			1.938 [1.86]	2.851 [2.73]**
<i>Community characteristics</i>				
Community lnpcce	1.541 [0.80]	1.585 [0.85]	1.595 [0.87]	1.647 [0.91]
Piped water	0.827 [0.53]	0.838 [0.49]	0.899 [0.29]	0.959 [0.11]
Time to puskesmas	0.979 [0.91]	0.98 [0.88]	0.981 [0.82]	0.981 [0.80]
Number methods available	0.979 [0.51]	0.974 [0.62]	0.97 [0.72]	0.953 [1.10]
<i>Interactions</i>				
MFI borrowing * lnpcce		2.473 [1.60]		
MFI borrowing * desires no more children				0.032 [3.88]**
Observations	656	656	656	656
Number of individuals	328	328	328	328

Absolute value of z statistics in brackets

* significant at 5%; ** significant at 1%