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Does Access to Family Planning Services Improve
Women's Welfare? Evidence on Dowries and Intra-
Household Bargaining in Bangladesh

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Abstract

This paper demonstrates how the availability of family planning and maternal and child health services alters the structure of intra-household bargaining. Despite the intention of many family planning programs to empower women through fertility control, I observe that when women obtain access to services only through marriage, there can be offsetting welfare changes in their bargaining power and in the dowries they are required to pay their husbands. To understand these effects, I develop a model that allows for the possibility of household adjustments to external shocks to occur along two margins simultaneously— both before marriage through a dowry payment as well as within marriage through a shift in the bargaining weights. I then examine the marriage market effects of a quasi-randomized family planning program in rural Bangladesh using 1996 cross-sectional data on nearly 4,500 households. I find that women pay 14 percent higher dowries in order to obtain husbands with access to the program, and this result is confirmed in a difference-in-differences specification. Moreover, compared to women without program access, women in the treatment area are 33 percent less likely to be able to make large purchases without permission from their husbands or another household member. The fact that I observe adjustments both before and within marriage suggests that marital contracts in Matlab occur in a setting of limited commitment.

JEL Codes: D13, J12, J13

Keywords: Marriage, intra-household bargaining, family planning

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1. Introduction

Programs to limit fertility and provide maternal and child care hold the potential to improve socioeconomic outcomes in developing countries. Evaluations of quasi-randomized family planning programs in Bangladesh and Colombia document large declines in fertility (Phillips et al. 1982, Koenig et al. 1992, Miller 2005). Other evaluations find evidence of secondary effects on household behavior, including increased human capital investments and reduced child labor supply (Sinha 2003, Joshi and Schultz 2007). In this paper, I demonstrate a further avenue through which family planning programs can affect the welfare of individual members of the household: access to a program can alter marriage market behavior and change the dynamics of post-marriage intra-household bargaining.

Despite the intention of many family planning interventions to empower women by giving them more control over the fertility decision, I observe when men control access to the program, women may actually become worse off. I develop a model that unites the household bargaining literature with the development literature on dowries by allowing for the possibility of household adjustments to external shocks to occur not only within marriage through changes in bargaining weights but also before marriage through a dowry payment. The model predicts that when men control access to the program, their share of the marital surplus will increase at their wives' expense. I then test this prediction on the treatment and comparison groups of an ongoing quasi-randomized family planning program in Bangladesh. Using probit models for multiple measures of female decision-making power within the household, I find that women who reside within program treatment areas (i.e. treated women) are between 4 and 7 percentage points less likely (a 33 percent differential from the mean) than women in the comparison areas (i.e. untreated women) to be able to make large purchases without permission from their husbands or another household member. This paper is the first to apply direct empirical measures of control

over household resources to conduct a theoretically motivated test of this important but largely overlooked link between family planning and maternal and child health services and intra-household bargaining. Furthermore, a difference-in-differences model indicates that women who marry after the program begins pay 14 percent higher dowries in order to secure husbands within the treatment area.

I obtain my results using 1996 cross-sectional data on approximately 4,500 households in the nearly 150 villages of Matlab district, a rural agricultural area of Bangladesh 55 km southeast of Dhaka (see Figure 1). Since 1977, a maternal and child health and family planning program (the MCHFP) has been operating in randomly chosen but contiguous geographic blocks within Matlab. I show in this paper that the services provided by the program not only reduce fertility rates in the treatment area when compared with the control area, but they also enhance the health

and outline a model that expects a different margin of adjustment, where the change in the marital surplus due to the new program endowment will instead be transferred from wife to husband at the time of marriage through a dowry payment. In this case, increased dowries paid to treatment area men on the marriage market will negate any shift in bargaining weights after marriage. This change occurs only for women who marry after the program begins; there should be no significant differences in dowry payments among already-married women in the treatment and comparison areas.

Rather than follow the previous literature and restrict changes to only one of these margins of adjustment, I remain agnostic about each couple's choice of marriage contract revision. This allows the possibility that a couple on the post-program marriage market may in fact choose to adjust along both margins, partially increasing the dowry payment while simultaneously altering the sharing rule. My empirical results suggest just this mix—I separate the data sample by period of marriage to find that women in post-program marriages (i.e. those marriages occurring after the program begins) both increase their dowry payments to treatment area men and exhibit decreased bargaining power within the marriage. Meanwhile, women in pre-program marriages show a similar bargaining power differential but no differences in dowry payments.

More specifically, the data shows that the ability of treatment area women to independently make large economic purchases is between 4 and 7 percentage points lower than women in the control group for both pre-existing and post-program marriages. I interpret this result as indicating that the MCHFP induces a renegotiation of the sharing rule, which in turn implies that marital contracts in Matlab occur in a setting of partial commitment. I do not find significant differences in the level of independence over large purchases for the cohorts of women who are ineligible for direct participation in the program, including unmarried women in

their fertile years and married women who were past menopause before the program began. The bargaining power changes that I observe for treated cohorts are therefore likely related to the family planning program itself and its effect on the intra-household dynamics of married couples.

Despite the many previous studies arguing that the comparison area villages are an appropriate control for the treatment villages, there may be some concern that my results merely reflect pre-existing or unobservable differences between the two groups. Although I am limited to a cross-sectional sample of these women and cannot look directly at pre-program outcomes, I can observe the pre-program cohort of women (i.e. women past menopause at the start of the MCHFP), and I find few substantial demographic differences between pre-program women living in the treated and untreated areas. I also look at descriptive statistics from a 1974 pre-program census of the Matlab population and perform several robustness checks on the main results, but like all other studies using this data, it is ultimately impossible to fully account for unobservable characteristics.

However, when estimating my second set of results on changes in dowry payments to treatment area males, I can apply a difference-in-differences style specification to control for such unobservables. In this case, the data records retrospective dowry information for all couples, which allows me to find the change in dowry payments over the pre and post-program periods for the treatment area, after accounting for the corresponding change in the control area. While there are no significant differences between dowry payments paid to treatment and comparison area men in pre-existing marriages, treatment area men in post-program marriages receive dowry payments that are 1,100 taka higher than their untreated counterparts (a 14 percent difference). These results are confirmed in a difference-in-differences set-up, which shows that treatment area males begin receiving higher dowries than untreated males in 1978, a few months after the family planning program begins (significant at the 10 percent level). Combined with

my first set of results on bargaining power, these findings suggest that many couples negotiate with limited commitment and respond to shocks along multiple margins of adjustment.

Moreover, my findings also caution that when family planning programs are administered such that men control access, they may appropriate the entire increase in marital surplus due to the program and consequently induce negative long-term welfare changes for women.

In the next section, I describe the Matlab family planning program and its first-order impacts. I then develop a model that outlines the comparative static effects of the program endowment on female bargaining power (in a setting of non-commitment) and dowry payments (in a setting of full commitment). After I discuss the dataset used in my analysis, I present my empirical results and conclude.

2. The Matlab Maternal and Child Health and Family Planning Project

Sponsored by the International Centre for Diarrheal Disease Research in Bangladesh, the Maternal and Child Health and Family Planning Project began in 1977 and remains ongoing today (Aziz and Mosley 1994). The program administrators designated the treatment and control areas of the program by dividing Matlab into 6 geographic blocks chosen at random. For

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At the beginning of the project, contraceptive use was low across the entire district, and fertility rates resembled those of pre-transitional demographic areas. A 1974 census reveals the Matlab area to be demographically homogenous before the project begins (Fauveau and Chakraborty 1994, Joshi and Schultz 2007), and Sinha (2003) backs up this finding using 1996 data. Although the large sample size of the 1974 census results in significant differences between the future treatment and control groups across several indicators, Table 1 shows most of these differences to be small in magnitude (with the exception of the proportion of each group that is Muslim, which the empirical specifications control for).

Descriptive statistics in 1996 for the pre-program female cohort (women already past menopause at the inception of the MHCFP) show few significant differences between women living in the treatment vs. comparison areas (see Table 2). Pre-program women in the treatment area have an average of 1/5 fewer male child deaths, and yet this statistic may be entangled with a program effect, since these families could still have taken advantage of intensive child health services despite no longer being fertile. Regarding labor force participation, when asked to recall any employment beyond housework twenty years earlier (1976, the year before the MCHFP begins), treatment area women were 14 percentage points less likely than control women to report having participated in outside work.² This trend between the experimental areas continues through 1996 (see Table 6), so I control for outside work in my empirical specifications.³

² I define labor force participation for women as claiming some job other than housework as their primary activity over the past month. Because *purdah* prevents women from leaving their bari often and participating in the public sphere, such jobs are done at home (Amin and Pebley 1994). Nearly half the women who currently work cite rearing hens and ducks as their job, with a further third husking paddy.

³ There do not appear to be any differences in 1974 between labor force participation rates of married women in the treatment and control areas (see Table 1). I am unsure why the 1974 census results vary from the labor force results shown by the smaller MHSS sample in 1976 and 1996; consequently, I am careful to control for it.

In the treatment villages, local community health workers visit all fertile, married women in their households fortnightly, offering a range of contraceptives,⁴ immunizations for pregnant women, and child nutritional and health advice⁵ (Fauveau and Chakraborty 1994). In 1982, half the treatment area also began receiving expanded services, consisting of prenatal care and immunizations for all women and children, with these services later being diffused throughout the rest of the treatment villages.⁶ Since 1989, then, community health workers have been providing the entire treatment group with comprehensive immunization services, nutritional education, help with childhood dysentery diseases, and extensive maternity care.

In contrast, women in the control villages have access only to the government-sponsored health program, which began in 1965 but remains much less intensive than the MCHFP program. While women treated by the MCHFP receive regular home visits from local female trained health workers, women in the control group receive very infrequent visits from government workers⁷ and must travel to the nearest government clinic to obtain services. These clinics are often dirty and unsterile, the government workers are usually male, and counseling is not typically done in private (Foster 1994, Piet-Pelon and Rob 1997, Joshi and Schultz 2007). Moreover, restrictions on female mobility outside the bari⁸ severely limits their access to the services available at these clinics. *Purdah* (female seclusion) ensures that the MCHFP area with its in-home services becomes something that women will actually pay to marry into, rather than

⁴ Contraceptive types include IUD, injections, sterilization, oral birth control pills, and condoms.

⁵ Initial health services included tetanus toxoid immunizations for pregnant women, neonatal vitamins, maternal and child nutritional advice, and oral rehydration for diarrheal diseases.

⁶ These expanded services included tetanus toxoid immunizations for all women of reproductive age, measles immunizations for children, and prenatal care and safe delivery kits for pregnant women. From 1986 on, all treatment blocks received complete immunizations against EPI diseases, vitamin A supplements, and nutritional rehabilitation (Fauveau and Chakraborty 1994).

⁷ Each control area household should receive a visit by government workers every two months, but the average number is actually 3.6 visits per year (Janowitz et al. 1997).

⁸ A bari is a group of often inter-related households that share the same courtyard, living and working closely together.

simply trading a longer travel time to services for the relatively lower dowries required by the control area.

examining the effects of this endowment on female power within the household.⁹ In these models, bargaining weights determined by distribution factors¹⁰ govern intra-household resource allocations, with the outcome being dependent on the marital threat point (the allocation that occurs if couples cannot agree). This threat point is typically defined as divorce or remaining single, thereby hinging intra-marital bargaining power on the opportunities available to partners outside of their marriage.¹¹ Even though only 7 percent of my data sample ever gets divorced, it may still be the relevant threat point for the Matlab population (it is just rarely reached).

An unanticipated shock like the MCHFP may induce a renegotiation of the bargaining weights for all couples in pre-existing marriages in order to appropriately reflect the husband's new endowment (and the increase in his threat point). To specify this change, I develop a model with transferable utilities between the husband and wife. Marriages in Matlab are usually arranged by the couple's families, and I follow Anderson (2000) and Mobarak et al. (2007), among others, in combining the utilities of the bride and groom with their families.¹²

Assume that the household maximizes the following welfare function:

$$U^f + U^m = QC$$

$$\text{where: } C = c^f + c^m$$

$$Q = \begin{cases} q & \text{if untreated household} \\ hq & \text{if treated household} \end{cases}$$

⁹ Bargaining can be cooperative, in which case it is assumed that marital agreements are costlessly enforceable and the outcome is always efficient (Manser and Brown 1980, McElroy and Horney 1981), or it can be non-cooperative, in which case the outcome may or may not be efficient (Lundberg and Pollak 1993). Recent examples relating to fertility decisions include Oreffice 2003, Chiappori and Oreffice 2005, Rasul 2005, and Iyigun and Walsh 2007.

¹⁰ Examples of distribution factors could include income earned by each spouse, unearned income endowments, sex ratios determining relative scarcity of each gender, or control over fertility decisions and availability of fertility control technology (Chiappori et al. 2002, Oreffice 2003, Chiappori and Oreffice 2005). These factors are often assumed exogenous, but a few recent papers have endogenized the marital bargaining weights, as in Basu (2006) and Iyigun and Walsh (2007), where the consequence may be an inefficient outcome.

¹¹ Alternatively, when marriage involves some cooperative behavior, bargaining power may instead hinge on non-cooperative options of behavior that may make at least one spouse better off (Lundberg and Pollak 1993).

¹² For simplicity, I assume fully benevolent parents who, despite arranging the marriage, do not consider any utility other than their child's when making decisions.

There are two private consumption goods in marriage (c^i), where i indexes male (m) or female (f), and one public good, quantity of children (q). A household that is treated by the family planning program receives an exogenous endowment of h ($h > 1$ for treated households, $h = 1$ for untreated households). I choose a complementary utility function in order to ensure an interior solution to the maximization problem.

The household is also subject to a budget constraint,

$$c^m + c^f + pq = y^f + y^m = Y,$$

where p is the price of children, y^i are exogenous private wealth endowments, and the price of consumption is set to 1. Using the budget constraint to substitute for C , the household maximization problem expands to:

$$\text{Max}_q (hq)(Y - pq).$$

From the first-order condition, I solve for q^* and substitute back in to find the couple's utility:

$$U^f + U^m = \frac{hY^2}{4p}. \quad (1)$$

A higher h increases total household utility. Since h is acquired solely through marriage to a treatment area male, it therefore becomes a positive trait for males on the marriage market.

If this hypothesis is true, then the new endowment given to treatment area males should be represented by an increase in their outside options on the marriage market (i.e. an expansion in their pool of potential mates). I find that between the pre and post-program periods, the prevalence of inter-area marriages (e.g. marriages between a treatment area person and a control person) increases from 7 percent to 16 percent (t-test significant at the 1 percent level, this sample includes all marriages between 1975-1976 for the pre-program period and 1978-1982 for the post-program period). I also apply a difference-in-differences specification that uses

retrospective census information on birthplaces and marriage years, finding that treated males on the post-program marriage market are 37 percent less likely than treated males on the pre-program market to choose a wife from within the treatment area (a 35 percentage point decrease, significant at the 1 percent level, see Table 4). These results suggest that treated males are in fact able to attract mates from a larger pool.

In contrast to their utility when married, the maximization problems of the male and female who remain single are:

$$\text{Max}_{c^i} c^i \quad \text{s.t. } c^i \leq y^i, \text{ for } i=m,f.$$

Children are a public good that can only be had in marriage and do not enter the single's problem. The solutions delineate the reservation utilities of the male and female, such that

$$\begin{aligned} \bar{U}^f &= y^f \\ \bar{U}^m &= y^m \end{aligned}$$

The marital surplus, or the gains from marriage, is then found by subtracting the reservation utilities from the couple's utility (1):

divorcee's parents, who might believe their obligation to pay dowry was fulfilled by her first marriage, may be reluctant to welcome her home for the fear of having to pay another dowry in the future.¹³

Not surprisingly, then, when divorce does occur, it is often initiated by the husband rather than the wife (Bhuiya and Chowdhury 1997). The exogenous shock of the family planning program will not be enough to trigger divorce among Matlab women, because the gains to marriage for them remain so large (Weiss 2001). Rather, Matlab women are likely to tolerate many unfavorable changes within their own marriage (such as decreased bargaining power) before accepting divorce.

3.1. No Commitment: Bargaining Power within Marriage

Suppose there exists some sharing rule θ ($\theta \in [0,1]$) to divide the marital surplus between the husband and wife, such that the wife receives θ and the husband receives $(1-\theta)$. This parameter will be a function of their reservation utilities (which describe their options outside the marriage), any dowry payment (d) made before marriage from the bride's family to the groom's, and other exogenous determinants of bargaining power ω (e.g. cultural norms, the population sex ratio, etc.). Each partner's share of the surplus is received on top of their reservation utilities, making the utility of the female when married:

$$U^f = \theta \frac{hY^2 - 4pY}{4p} + y^f. \quad (3)$$

Similarly, the utility of the married male is:

$$U^m = (1-\theta) \frac{hY^2 - 4pY}{4p} + y^m. \quad (4)$$

¹³ It can be difficult to enforce the repayment of even a portion of the dowry upon divorce in Matlab, and so it is typically not returned.

It is easy to show that for a given θ , a wife who marries a husband living in the treatment area achieves a higher utility:

$$U^f = \begin{cases} \theta \frac{Y^2 - 4pY}{4p} + y^f & \text{if husband untreated} \\ \theta \frac{hY^2 - 4pY}{4p} + y^f & \text{if husband treated} \end{cases}$$

If instead, θ is allowed to vary in order to keep utility constant across treated and untreated women, I find:

$$\underset{\text{untreated}}{\theta} \frac{Y^2 - 4pY}{4p} + y^f = \underset{\text{treated}}{\theta} \frac{hY^2 - 4pY}{4p} + y^f$$

3.2. Full Commitment: Dowry Payments before Marriage

In contrast to the bargaining literature that enables adjustments to shocks to occur within marriage (thereby requiring no binding commitment to the division of the marital surplus), a second prevailing strand of the literature assumes a setting in which the extra marital surplus attained through this endowment will be appropriately transferred before marriage, such that households designate a point on the ex-ante Pareto frontier.¹⁴ These full commitment models, in which household resource allocation is credibly committed to through pre-marital negotiations, have been widely applied in the development literature under the assumption that utilities are easily transferable in dowry payments (Becker 1981, Rao 1993, Deolalikar and Rao 1998, Anderson 2000, Arunachalam and Naidu 2006). In th

Again, the intuition is straightforward. The family planning program provides males with an extra endowment that increases the payoff to the female of matching with a treated male.

This endowment generates a division between $\theta^{treated}$ and $\theta^{untreated}$. For women not yet married, they have the option to buy mo

Using data on fertile married couples in 1996, I find that fewer than 1 out of 5 Matlab couples actually disagree over the desired number of additional children (see Table 5). This number is constant across both treatment and control areas, and its insignificance does not vary according to birth cohort.¹⁵ Moreover, Freedman (1997) and Koenig et al. (1987) find no evidence that the program has altered the fertility preferences of women (it merely enabled the expression of already-existing demand for fewer children).

believed that their relatives approved as well (Koenig et al. 1992). This result is intuitive; the male must receive some benefit from the family planning program, or he would not allow his wife's participation in the first place. My model explicitly incorporates this willingness to participate in its assumption that the MCHFP improves the quality of each child, which subsequently increases total household utility. Overall, therefore, the ancillary evidence available within the data is more consistent with the assumptions and predictions of my model rather than the story of information advantage developed by Arunachalam and Naidu (2006).

3.3. Adjustments along Both Margins

Thus, two separate strands of the literature predict different adjustments to the program endowment. First, the bargaining literature suggests that the bargaining power of treatment area women will decline relative to untreated women. On the other hand, the full commitment literature insists that the marriage market can completely offset any potential change in bargaining weights due to the MCHFP endowment, since women will pay increased dowries. However, forcing all changes to occur solely along one dimension may be too restrictive. The application of bargaining models within a developing country context allows for adjustments to occur along two margins simultaneously—women may choose to pay only some portion of that increased dowry in return for some smaller change in bargaining power. This option may be chosen if utilities are only partially transferable between husband and wife. Moreover, the husband may force this option if the bargaining power of the female within the marriage will already be so low as to make further downward adjustments impossible (this may be especially relevant in many developing countries, where wives traditionally have had little control over household resources). In that case, he will require at least a portion of the surplus to be transferred at the outset through dowry.

Figure 3 depicts the indifference curves of women in the (θ, d) plane, illustrating the corner solutions and the corresponding range of possible intermediate cases. For treatment area women, a higher value of h shifts their isoquants in the northwest direction. The bargaining literature restricts program adjustment to a horizontal movement from $\theta^{untreated}$ to $\theta^{treated}$, while Arunachalam and Naidu (2006) restrict it to a vertical movement from $d^{untreated}$ to $d^{treated}$. However, rather than pin down one specific

their spouses (with the exception of spousal years of education, which is a third of a year higher for treated women). Treated women do, however, receive significantly greater amounts of transfers from other households (measured in both monetary and in-kind transfers), and this results in a total household income that is nearly 5,000 taka higher than untreated households (an 11 percent differential).¹⁷ Labor force participation rates for fertile married treated women are 5 percentage points lower than rates for untreated women, but as noted earlier, this difference reflects the continuation of a pre-program trend (see Table 2).

Table 7 looks at the extent of female power over economic resources. Specifically, I measure the percentage of women who do not need permission from their husband or another household member to make purchases. I follow Williams (2005) in categorizing the purchases as large (items at the daily market, betel leaf, saris for themselves, and children's clothing) or small (kerosene or cooking oil for the family, bangles or soap for their own use, and sweets or ice cream for children). Women treated by the program are on average 5.5 percentage points less likely to be able to independently purchase any of these items (a differential of 9 percent for small purchases and 39 percent for large purchases).

The cross-sectional sample used for the probit estimations of bargaining power over purchases consists of all married women surveyed by the MHSS dataset who are fertile for some period after 1977 (the first year of the program). A small number of these women are missing spousal information; thus, I lose some observations depending on the particular control variables used. Because the family planning program was

married couples in the treatment area, reverse causality is not a concern in those regression results.¹⁸

However, endogeneity due to unobservables that differ between the treatment and control areas may be an issue. To that end, I include several control variables in my specifications, beginning with information on the individual herself (the percentage of her married years she has been J-.e2aeti0014 Tw2D-.0 a

periods (see Table 8). Furthermore, after restricting the sample to only those observations that report having received some form of positive dowry, I do not find significant differences for pre-existing marriages between dowries paid to treatment or control males. Since these women

Female labor supply is also strongly correlated with household bargaining power. Fertile married women with primary jobs other than housework in 1996 are between 3 and 6 percentage points more likely to be able to independently make purchases of any size (see Table 10).²³ In addition, female unearned income (transfers received from friends or relatives) also carries a small but positive link to her control over resources. As noted earlier, the value of help received by treatment area women in 1996 is twice as much as that received by control women (see Table 6), so this effort may partially offset the negative program effects on treated women.

A female's choice of spouse does not have much consequence for her bargaining power within the household, with the exception of spouse age, which is associated with a 1 to 2 percentage point increase in female control over resources. Household income also matters little, as indicated by larger but mostly statistically insignificant marginal effects. In addition, the payment of a dowry has an overall indeterminate effect on decision-making power within marriage, although this indicator measures only whether dowry was received and not its value.

5.3. Robustness Tests

I conduct further sensitivity analyses on these results. Since program treatment status is a village-level indicator, I cannot incorporate village fixed-effects to control for unobservable village-specific characteristics. However, the results remain robust to controlling for several observed village characteristics, including travel time in minutes to the nearest large market, travel time in minutes to the nearest small market, the proportion of households with electricity, whether the village is protected by the Meghna-Dhonogoda flood embankment, and dummy variables for whether the village has a credit institution, irrigation for crops, some type of cottage industry, or some type of other industry (including a mill, factory, or workshop; see Table 13).

The results are also robust to restricting the sample to treatment villages sharing a border with a control village, and control villages sharing a border with a treatment village (e.g. border villages). In fact, the magnitude of the difference between the relative bargaining power of treated and untreated females becomes even greater with this sample (see Table 13). Such a finding is consistent with the program endowment effect of my model— Matlab women yield bargaining power to obtain or hold onto treated men. Those women living near the program border search for mates on a marriage market with a mixed supply of treated and untreated males. As a consequence, they are relatively more likely to be stuck with an untreated man when compared with women living in the far reaches of the treatment area (where all men on their local marriage market are treated). Thus, I expect border women to be willing to sacrifice more for treated men than their neighboring treated women near the edges of Matlab. The observation of this result in the data further distinguishes my model from that of Arunachalam and Naidu (2006), who would predict that compensation to treated husbands for having fewer children should be similar throughout the program area, rather than varying based on village location.²⁴

5.4. Further Evidence: Unaffected Cohorts

If the family planning program is driving the observed changes in female decision-making power within the household, then this effect should be absent for those groups of women

²⁴ A remaining econometric issue may be the potential selection of women into post-program marriages with treatment area men, which could confound the estimates for those marriages. However, it is extremely difficult to find a suitable instrument for a selection model, because it must be correlated with a female's choice to marry a treated male while remaining independent of her subsequent bargaining power within that marriage, which is itself a function of her outside options for any potential future marriage. Instead, I applied a technique recently developed in Altonji et al. (2005) that estimates the extent of selection on observable variables and uses it as a proxy for the extent of selection on unobserved variables. Even after accounting for selection, fertile married women in treatment areas are on average at least 2 percentage points less likely to make large purchases independently (a difference of 3 percentage points from estimates in Table 10), and women in post-program marriages are at least 4.5 percentage points less likely to do so (a difference of 2.5 percentage points from Table 12). Thus, it does not appear that any bias resulting from selection into post-program marriages with treated men is likely to be large enough to fully account for the difference in bargaining power observed between treated and untreated women.

who are not impacted by the program. Thus, there should be no difference between the bargaining power of women in the treatment and control areas if they are unmarried or infertile. Estimating the models for the sample of unmarried women who are in their fertile years in 1996 shows no differences between the power of treatment and control area women over resources (see Table 14).²⁵ Similarly, I find no differences among the pre-program cohort of currently married women who were past menopause by 1977, the first year of the program. These results point to the ability to participate in the family planning program as the true source of decreased bargaining power for treated women.

Some members of the cohort of currently se

future marriages. Because these shifts appear to stem from (perhaps unintentionally) determining treatment access based on location of the husband, the results of this paper underline the importance of carefully targeting whether the husband or wife will control access to such a program.

I show that in order to obtain access to program services, women in post-program marriages are willing to pay dowries to treatment area men that are 14 percent higher than payments to men in the comparison area, and this result is corroborated through a difference-in-differences specification. Using cross-sectional data on married couples who are fertile during some period of the program, I further show that the program decreases female independence over large economic purchases by 4 to 7 percentage points when compared to women in the comparison area (a difference of 33 percent). This shift in bargaining power is exhibited by women in both pre-existing and post-program marriages. The observation of marginal adjustments to the program endowment both before and within marriage suggests that marital contracts occur in a setting of only partial commitment.

The MCHFP has reduced fertility rates and child mortality in addition to increasing birth spacing for the women it treats. This paper presents evidence that the program has also caused significant declines in female power over the allocation of household resources. This shift in bargaining power occurs not merely for the direct participants of the program, but it covers all potential participants (all fertile, married women) residing in the treatment area. Thus, the MCHFP may have induced some unintended negative welfare effects for women that have long-term consequences for household behavior across even non-participant households.

Figure 1: MCHFP Treatment and Control Areas

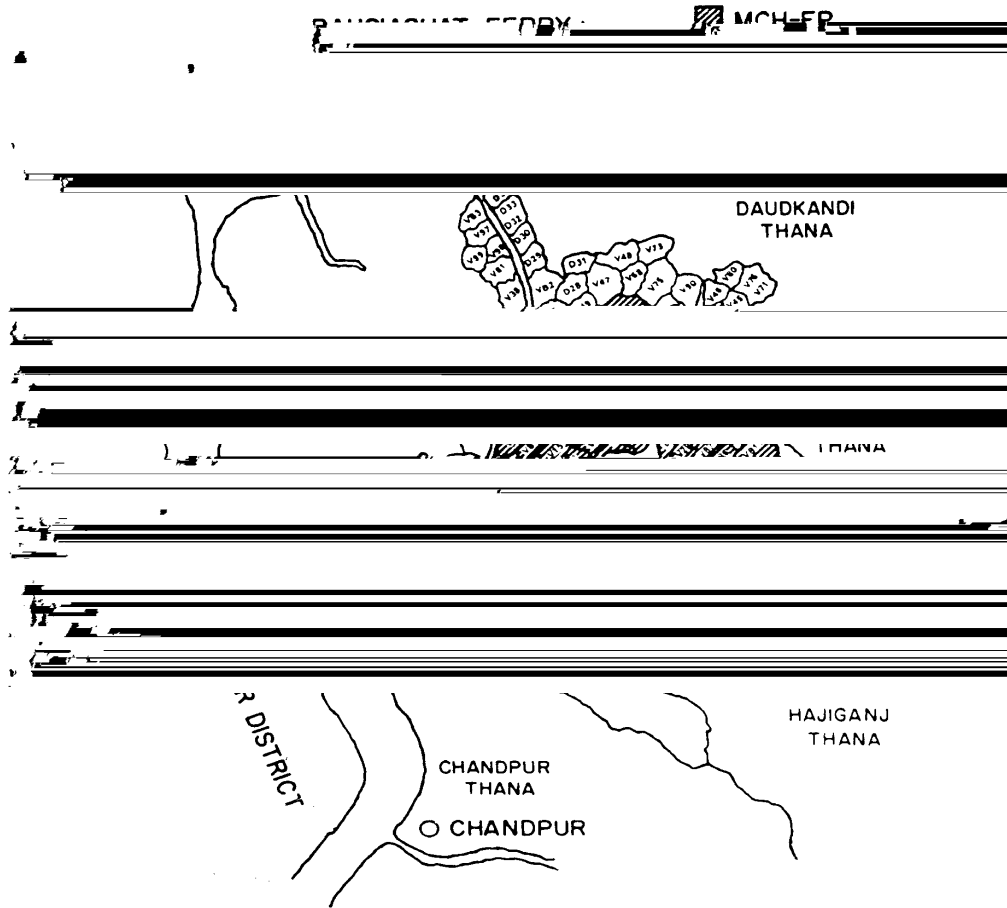
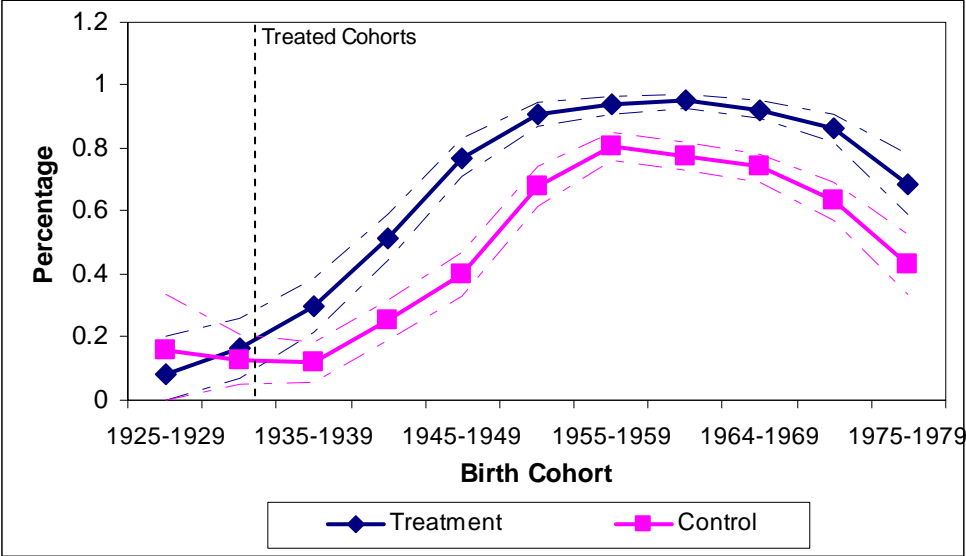
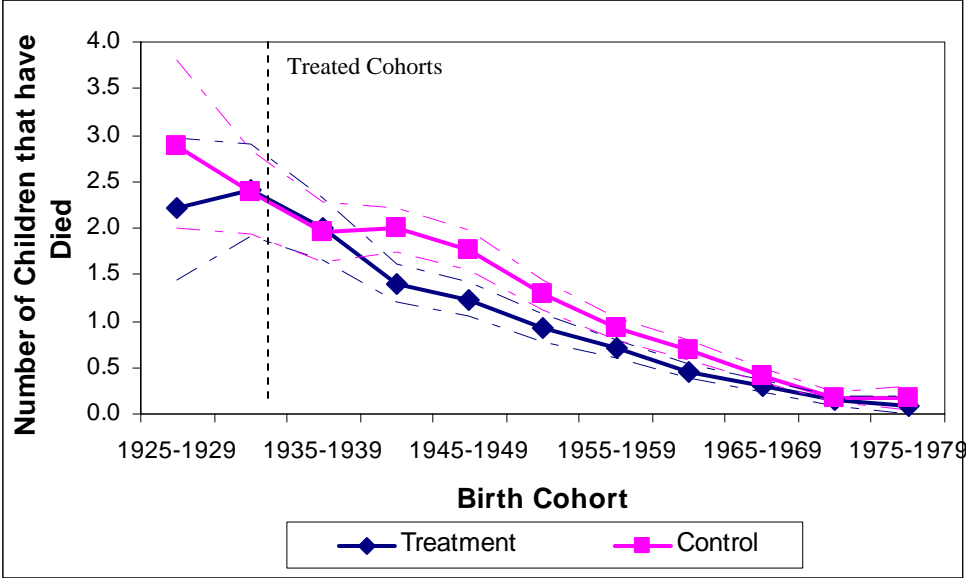


Figure 2a: Married Women Ever Using Contraceptives, by Treatment Group and Birth Cohort



Dashed lines indicate 95% confidence intervals.

Figure 2b: Average Number of Child Deaths Per Married Women, by Treatment Group and Birth Cohort



Dashed lines indicate 95% confidence intervals.

Table 1: Descriptive Statistics from a 1974 Pre-Program Census

<i>1974 Census</i>	<i>Treatment</i>	<i>Control</i>	<i>Difference</i>
Male Years of Education	2.14 (3.63)	1.93 (3.45)	.21*** (.03)

Table 2: Descriptive Statistics from the MHSS for the Pre-Program Cohort

<i>Pre-Program Cohort</i>	<i>Treatment</i>	<i>Control</i>	<i>Difference</i>
Age at First Marriage	12.71 (3.87)	13.01 (3.11)	-.30 (.35)
Age at First Birth	18.10 (4.42)	18.80 (4.78)	-.71 (.46)
Ever Used Contraception			

Table 3: First-Order Effects of the MCHFP

<i>Fertile Married Women</i>	<i>Treatment</i>	<i>Control</i>	<i>Difference</i>
Ever Used Contraception	.92 (.28)	.71 (.45)	.20*** (.01)
Current User	.76 (.43)	.54 (.50)	.22*** (.02)
Spacing Between Births	3.17 (1.16)	2.77 (1.09)	.40*** (.05)
Completed Fertility*	7.02 (2.50)	7.23 (2.55)	-.22* (.12)
Number of Sons that have Died	.29 (.59)	.34 (.65)	-.05** (.03)
Number of Daughters that have Died	.29 (.59)	.40 (.70)	-.11*** (.03)
Percentage having a Stillbirth	.09 (.29)	.12 (.32)	-.03** (.01)
Obs.	1275	1270	
Percentage having Children Vaccinated	.95 (.21)	.64 (.48)	.31*** (.02)
Obs. - Women with Children Under 5 yrs.	821	876	
Children Under 15 Years Old			
Sick Days in past Month	2.80 (4.75)	3.01 (5.03)	-.21* (.12)
Obs.	2997	3136	
Children Under 5 Years Old			
Body Mass Index	15.81 (14.36)	15.21 (6.91)	.59 (.64)
Obs.	580	631	
Infants			
Body Mass Index	16.44 (14.40)	15.63 (6.82)	.81 (1.30)
Obs.	123	157	

Standard deviations in parentheses (standard errors in parentheses for difference). ***indicates t-test significant at 1% level; **indicates t-test significant at 5% level; *indicates t-test significant at 10% level. Completed fertility measured for women have completed their fertility cycle by 1996. Vaccinations measured for those women with children under 5 years of age in 1996.

Table 4: Effects of the MCHFP on the Pool of Mates for Treatment Area Males

<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>
2.92***		2.92***		2.53***	
(.09)		(.08)		(.06)	
.49***		.49***		.48***	
(.03)		(.02)		(.03)	
-.91***		-.91***		-1.07***	
(.06)		(.06)		(.08)	
		-.01		-.00	
		(.01)		(.02)	
		.01		.01	
		(.01)		(.01)	
		.02		.03	
		(.05)		(.05)	
		-.01		-.01	
		(.01)		(.02)	

Table 5: Family Approval of Contra

Table 6: Descriptive Statistics for Fertile Married Women

<i>Fertile Married Women</i>	<i>Treatment</i>	<i>Control</i>	<i>Difference</i>
Age at First Job	12.90	13.15	-.25

**Table 7: Descriptive Statistics for Fertile Married Women
(Measures of Bargaining Power)**

Able to Make Large Purchases	Treatment	Control	Difference
Items at Daily Bazaar	.13 (.33)	.18 (.39)	-.05*** (.01)
Betel Leaf	.19 (.39)	.25 (.43)	-.07*** (.01)
Saris for Self	.11 (.32)	.16 (.37)	-.05*** (.01)
Children's Clothing	.11 (.31)	.16 (.37)	-.05*** (.01)
<i>Obs.</i>	1630	1569	
Able to Make Small Purchases	Treatment	Control	Difference
Kerosene or Cooking Oil	.49 (.50)	.54 (.50)	-.04** (.02)
Bangles or Soap for Self	.50 (.50)	.56 (.50)	-.06*** (.02)
Sweets for Children	.59 (.49)	.64 (.48)	-.05*** (.02)
<i>Obs.</i>	1630	1569	

*Standard deviations in parentheses (standard error in parentheses for difference). *** indicates t-test significant at 1% level; ** indicates t-test significant at 5% level.*

Table 8: Mean Value of Dowries Received by Males

	Percentage Receiving Dowry			Value of Dowry Received		
	<i>Treatment</i>	<i>Control</i>	<i>Difference</i>	<i>Treatment</i>	<i>Control</i>	<i>Difference</i>
Pre-Program Marriages	.06 (.24)	.04 (.20)	.02** (.01)	3593.55 (3635.1)	3586.70 (5649.52)	6.84 (927.84)
<i>Obs.</i>	1277	1328		55	47	
Post-Program Marriages	.35 (.48)	.36 (.48)	-.01 (.02)	8408.23 (8444.05)	7302.94 (6434.71)	1105.29* (632.06)
<i>Obs.</i>	853	899		271	289	

*Standard deviations in parentheses (standard errors in parentheses for difference). ** indicates t-test significant at 5% level; * indicates t-test significant at 10% level. Dowry value is in taka and is conditional on having received a positive dowry.*

Table 9: Effects of the MCHFP on Dowry Received by Males

*Standard errors in parentheses. *** indicates significance at 1%*

Table 10: Bargaining Power over Resources, Large Purchases (Currently Fertile Married Women)

	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	<u>Coef.</u>	<u>ME</u>	
Treatment Area	-0.23***		-0.30***		-0.24*		-0.22***		-0.28***		-0.25***		-0.24***		-0.30***		-0.24***		-0.24***		-0.29***		-0.22**
	(.08)		(.11)		(.12)		(.04)		(.04)		(.05)		(.06)		(.08)		(.09)		(.06)		(.08)		(.09)
Number of Births			-0.02		-0.01				-0.01		.00				-0.03		-0.03				-0.03*		-0.02
			(.02)		(.02)				(.01)		(.01)				(.02)		(.02)				(.02)		(.02)
Percent of Married Yrs. Fertile			-0.08		-0.27				-0.06		-0.22				.05		-0.00				-0.03		-0.15

Table 11: Bargaining Power over Resources, Small Purchases

	<u>Cooking Oil</u>				<u>Jewelry</u>				<u>Sweets</u>			
	No Controls		Controls		No Controls		Controls		No Controls		Controls	
	<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>	<u>Coeff.</u>	<u>ME</u>
Currently Fertile Married Women												
Treatment Area	-0.10 (.11)	-0.04	-0.07 (.11)	-0.03	-0.15 (.11)	-0.06	-0.13 (.11)	-0.05	-0.12 (.13)	-0.05	-0.10 (.13)	-0.04
R-sq.	.00		.05		.00		.05		.00		.05	
Obs.	3199		2489		3199		2489		3199		2489	
Pre-Program Marriages												
Treatment Area	-0.16 (.10)	-0.06	-0.15 (.11)	-0.06	-0.19* (.10)	-0.07	-0.17 (.11)	-0.07	-0.20** (.10)	-0.07	-0.18** (.09)	-0.07
R-sq.	.00		.03		.00		.04		.00		.04	
Obs.	2170		1799		2170		1799		2170		1799	
Post-Program Marriages												
Treatment Area	-0.11 (.09)	-0.04	-0.08 (.07)	-0.03	-0.15 (.10)	-0.06	-0.15* (.08)	-0.06	-0.12 (.12)	-0.05	-0.13 (.10)	-0.05
R-sq.	.00		.05		.00		.05		.00		.06	
Obs.	1823		1351		1823		1351		1823		1351	

Table 10 note (A) applies. Observations for currently fertile married women are married females fertile in 1996; observations for pre-program marriages are women married before 1977 and fertile for some period after 1977; observations for post-program marriages are women married after 1977 and fertile for some period after 1977. Specifications with controls include the full set of control variables used in Table 13.

Table 12: Bargaining Power over Resources (Alternate Specifications)

	Bazaar Items				Betel Leaf				Saris				Kid's Clothes			
	No Controls		Controls		No Controls		Controls		No Controls		Controls		No Controls		Controls	
	Coeff.	ME	Coeff.	ME	Coeff.	ME	Coeff.	ME	Coeff.	ME	Coeff.	ME	Coeff.	ME	Coeff.	ME
Single and Married Women																
Treatment Area	-0.08 (.12)	-0.02	-0.08 (.18)	-0.02	-0.13*** (.05)	-0.04	-0.13 (.09)	-0.04	-0.06 (.12)	-0.01	-0.07 (.15)	-0.02	-0.09 (.12)	-0.02	-0.05 (.13)	-0.01
Married	-0.16*** (.04)	-0.04	-0.02 (.05)	-0.00	-0.11*** (.01)	-0.03	-0.17*** (.06)	-0.05	-0.15* (.08)	-0.03	-0.08 (.08)	-0.02	-0.16** (.07)	-0.04	-0.04 (.08)	-0.01
Treatment Area * Married	-0.11* (.06)	-0.02	-0.16* (.10)	-0.04	-0.08 (.05)	-0.02	-0.12 (.10)	-0.04	-0.16* (.09)	-0.03	-0.19** (.08)	-0.04	-0.10 (.08)	-0.02	-0.19*** (.06)	-0.04
<i>R-sq.</i>	.01		.16		.01		.12		.01		.14		.01		.14	
<i>Obs.</i>	5138		4523		5138		4523		5138		4523		5138		4523	
Pre-Program Marriages																
Treatment Area	-0.12 (.08)	-0.03	-0.22** (.09)	-0.04	-0.20*** (.06)	-0.06	-0.22*** (.05)	-0.06	-0.16*** (.05)	-0.03	-0.26*** (.05)	-0.04	-0.15** (.06)	-0.03	-0.23*** (.08)	-0.04
<i>R-sq.</i>	.00		.04		.00		.02		.00		.02		.00		.03	
<i>Obs.</i>	2170		1776		2170		1792		2170		1776		2170		1776	
Post-Program Marriages																
Treatment Area	-0.29*** (.09)	-0.06	-0.30*** (.11)	-0.05	-0.20** (.08)	-0.05	-0.26*** (.09)	-0.06	-0.31*** (.06)	-0.06	-0.35*** (.09)	-0.05	-0.27*** (.06)	-0.06	-0.28*** (.08)	-0.04
<i>R-sq.</i>	.01		.06		.01		.05		.01		.07		.01		.07	
<i>Obs.</i>	1823		1340		1823		1340		1823		1340		1823		1340	
All Marriages																
Treatment Area	-0.12 (.08)	-0.03	-0.21** (.09)	-0.04	-0.20*** (.06)	-0.06	-0.21*** (.05)	-0.06	-0.16*** (.05)	-0.03	-0.24*** (.05)	-0.04	-0.15** (.06)	-0.03	-0.22*** (.07)	-0.04
Post-Program Marriage	.10* (.05)	.02	.16 (.10)	.03	-.21* (.11)	-.06	.01 (.16)	.00	.07 (.05)	.02	.16** (.07)	.03	.11*** (.03)	.02	.16 (.11)	.03
Treatment * Post-Program Marriage	-.17** (.07)	-.04	-.11*** (.04)	-.02	-.00 (.12)	-.00	-.07 (.11)	-.02	-.15*** (.06)	-.03	-.12*** (.05)	-.02	-.12*** (.03)	-.02	-.08 (.05)	-.01
<i>R-sq.</i>	.01		.04		.01		.03		.01		.03		.01		.03	
<i>Obs.</i>	3993		3135		3993		3151		3993		3135		3993		3135	

Table 10 note (A) applies. Observations for single and married women are all women fertile during some period after 1977; observations for pre-program marriages are women married before 1977 and fertile for some period after 1977; observations for post-program marriages are women married after 1977 and fertile for some period after 1977; observations for all marriages are all married women fertile for some period after 1977. Specifications with controls include the full set of control variables used in Table 13, except for the single and married women sample, which uses the following controls: number of births, outside job, female age, age-squared, female years of education, Muslim dummy, female earned income, female unearned income, household income, household income-squared, household land owned, and relationship to household head.

Table 13: Robustness Checks

<i>Dependent Variable</i>	All Women Married And Fertile in 1996				Pre-Program Marriages				Post-Program Marriages			
	<u>Treatment Area</u>		R-sq	Obs.	<u>Treatment Area</u>		R-sq	Obs.	<u>Treatment Area</u>		R-sq	Obs.
	<u>Coeff.</u>	<u>ME</u>			<u>Coeff.</u>	<u>ME</u>			<u>Coeff.</u>	<u>ME</u>		
<i>Able to Make Large Purchases:</i>												
<i>Border Villages Only (villages on the border of treatment and control areas)</i>												
Bazaar Items	-.50*** (.08)	-.07	.08	816	-.35*** (.12)	-.05	.05	562	-.71*** (.16)	-.09	.16	447
Betel Leaf	-.36*** (.12)	-.09			-.27** (.11)				-.52*** (.15)			
Saris for Self	-.46*** (.10)				-.35*** (.07)				-.80*** (.20)			
Clothing for Children	-.43*** (.09)				-.40*** (.10)				-.61*** (.18)			
<i>Full Sample with Extra Controls for Village-Specific Characteristics</i>												
Bazaar Items	-.25*** (.05)				-.18*** (.05)				-.28*** (.05)			
Betel Leaf	-.21*** (.06)				-.24*** (.05)				-.15*** (.05)			
Saris for Self	-.33*** (.04)				-.29*** (.05)				-.37*** (.06)			
Clothing for Children	-.28*** (.04)				-.21*** (.08)				-.28*** (.06)			

Table 14: Unaffected Cohorts

	<i>Unaffected Cohorts</i>											
	All Unmarried Women (Ages 13-45)				Currently Separated And Divorced Women				Married Infertile Women			
	<u>Treatment Area</u>				<u>Treatment Area</u>				<u>Treatment Area</u>			
	<u>Coeff.</u>	<u>ME</u>	R-sq	Obs.	<u>Coeff.</u>	<u>ME</u>	R-sq	Obs.	<u>Coeff.</u>	<u>ME</u>	R-sq	Obs.
<i>Dependent Variable</i>												
Able to Make Large Purchases:												
Bazaar Items	-.01 (.16)	-.00	.50	246	-.82 (.81)	-.04	.57	47	-.25 (.56)	-.00	.31	91
Betel Leaf	-.01 (.11)	-.00	.55	246	-.95 (.75)	-.04	.62	51	-.11 (.50)	-.02	.22	83
Saris for Self	-.01 (.25)	-.00	.43	246	-.36 (.66)	-.01	.58	47	-.25 (.56)	-.00	.31	91
Clothing for Children	.07 (.28)	.01	.52	246	-.72 (.77)	-.02	.56	47	-.31 (.54)	-.00	.24	80
<i>Dependent Variable</i>												
Able to Make Small Purchases:												
Cooking Oil	.02 (.24)	.01	.42	246	2.52** (1.27)	.66	.53	39	-.27* (.15)	-.10	.10	89
Jewelry for Self	-.03 (.23)	-.01	.39	246	2.52** (1.27)	.66	.53	39	-.24 (.17)	-.09	.10	89
Sweets for Children	.07 (.22)	.02	.37	246	1.38* (.83)	.50	.41	39	-.34* (.18)	-.14	.11	89

Table 10 note (A) applies. Observations for married infertile women include all currently married women that were past menopause by 1977. These specifications include the full range of controls used in earlier specifications, with the exception of spousal and dowry information for unmarried women.

References

- Altonji, J., Elder, T., and C. Taber. 2005. "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools," *Journal of Political Economy* 113(1): 151-184.
- Amin, S. and A. Pebley. 1994. "Gender Inequality within Households: The Impact of a Women's Development Programme in 36 Bangladeshi Villages," *The Bangladesh Development Studies* 22 (2-3): 121-154.
- Anderson, S. 2000. "The Economics of Dowry Payments in Pakistan," mimeo, Tilburg University.
- Anderson, S. and M. Eswaran. 2005. "What Determines Female Autonomy? Evidence from Bangladesh," BREAD Working Paper No. 101.
- Arunachalam, R. and S. Naidu. 2006. "The Price of Fertility: Marriage Markets and Family Planning in Bangladesh," Working Paper.
- Aziz, K. and W. Mosley. 1994. "Historical Perspective and Methodology of the Matlab Project," in *Matlab: Women, Children, and Health*, V. Fauveau (ed.), ICDDR,B Special Publication No. 35.
- Basu, K. 2006. "Gender and Say: A Model of Household Behavior with Endogenously-determined Balance of Power," *The Economic Journal* 116: 558-580.
- Becker, G. 1981. *A Treatise on the Family*

- Iyigun, M. and R. Walsh. 2007. "Endogenous Gender Power, Household Labor Supply, and the Demographic Transition," *Journal of Development Economics* 82(1): 138-155.
- Janowitz, B., Holtman, M., Hubacher, D., and K. Jamil. 1997. "Can the Bangladeshi Family Planning Program Meet Rising Needs without Raising Costs?" *International Family Planning Perspectives* 23: 116-121, 145.
- Joshi, S. and T. Schultz. 2007. "Family Planning as an Investment in Development: Evaluation of a Program's Consequences in Matlab, Bangladesh," Yale University Economic Growth Center Discussion Paper No. 951.
- Koenig, M., Phillips, J., Simmons, R., and M. Khan. 1987. "Trends in Family Size Preferences and Contraceptive Use in Matlab, Bangladesh," *Studies in Family Planning* 18(3): 117-127.
- Koenig, M., Rob, U., Khan, M., Chakraborty, J., and V. Fauveau. 1992. "Contraceptive Use in Matlab, Bangladesh in 1990: Levels, Trends, and Explanations," *Studies in Family Planning* 23(6): 352-364.
- Lich-Tyler, S. 2004. "The Dynamics of Bargained Household Decisions," Manuscript, Department of Economics, University of Texas.
- Lundberg, S. and R. Pollak. 1993. "Separate Spheres Bargaining and the Marriage Market," *Journal of Political Economy*,

- India,” *Journal of Political Economy* 101: 666-677.
- Rasul, I. 2005. “Household Bargaining Over Fertility: Theory and Evidence from Malaysia,” Working Paper.
- Sinha, N. 2005. “Fertility, Child Work, and Schooling Consequences of Family Planning Programs,” *Economic Development and Cultural Change* 54(1): 97-128.
- Udry, C. 1996. “Gender, Agricultural Production, and the Theory of the Household,” *Journal of Political Economy* 104(5): 1010-1046.