

THREE ESSAYS ON WOMEN IN DEVELOPING COUNTRIES

By

Jinyoung Pack

Dissertation

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

**DOCTOR OF PHILOSOPHY
IN DEVELOPMENT POLICY**

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Professor Seulki Choi

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Committee in charge:

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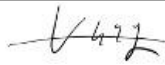
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ABSTRACT

THREE ESSAYS ON WOMEN IN DEVELOPING COUNTRIES

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CHAPTER 1: IMPACT OF PUBLIC PRESCHOOL EXPANSION ON FEMALE LABOR FORCE PARTICIPATION IN RURAL BANGLADESH

To test whether the expansion of public education can reduce women's domestic care burden and increase female labor force participation (FLFP) in rural areas, this study examines the large-scale nationalization of preschools in Bangladesh between 2013 and 2014. Focusing on differences in the number of nationalized preschools across districts, it finds that for every newly nationalized preschool per 1,000 children, the probability of women participating in income generating activities increases by 32 percentage points on average. This study also provides evidence for changes in the gendered division of labor within households: women's share of total household time spent on domestic work decreases by 20 percentage points and their share of farming increases by 27 percentage points, while men's share of domestic work increases by 29 percentage points on average.

CHAPTER 2: MOBILE FINANCIAL SERVICE AND FEMALE EMPOWERMENT - EVIDENCE FROM THE PRIMARY EDUCATION STIPEND PROGRAM IN BANGLADESH

This study explores the potential exclusionary effects of providing mobile financial services for women in rural areas who have limited access to cellphones. By examining a sudden change in the payment scheme of the government's Primary Education Stipend Program in Bangladesh in 2017, this study finds that the adoption of a mobile stipend payment scheme increased child education expenses and the perceived decision-making power of program participating mothers differentially according to personal cellphone ownership: Specifically, 113 percent higher expenses for personal teaching and 92 percent higher expenses for buying textbook and stationery for mothers who had a personal cellphone. To support these findings, this study reports several falsification test results using non-participating mothers and pre-intervention period samples.

CHAPTER 3: WOMEN'S CONTROL OVER MICROCREDIT AND INTRAHOUSEHOLD RESOURCE ALLOCATION: EVIDENCE FROM BANGLADESH

To explain the disconnect between women's access to loans and the desired social impacts of microcredit programs, this study investigates the intrahousehold bargaining process over loan use. Using a panel from Bangladesh, it finds supportive evidence for the gendered nature of economic activities, in which women's control over loans is limited. In addition, a positive linkage is identified between women's control over loan use and their input into household's economic activities, regardless of the gendered division of labor. Finally, "*who controls the loan*" is proposed as a critical factor that links microcredit and social impacts: all other things being equal, women's decision-making power over loan use is related to a 254 percent higher level of women's education expenses on average.

To mother, the hardest-working woman I know

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CHAPTER 1

IMPACT OF PUBLIC PRESCHOOL EXPANSION ON FEMALE LABOR FORCE PARTICIPATION IN RURAL BANGLADESH

INTRODUCTION

Unequal childcare responsibility results in a higher level of competing demands on women's time, which constrains female labor force participation (FLFP) in a large number of developing countries. Low FLFP is problematic in that it is an inefficient use of human capital and evidence of unproductive investment in girls' education. Recognizing its significance, governments often provide public childcare services or subsidies to promote FLFP. Theories predict that affordable and accessible formal or informal childcare services increase FLFP (Heckman, 1974; Cogan, 1981; Blau and Robins, 1988), but there is thin evidence for this in the context of developing countries, especially in rural areas (Pimkina and de La Flor, 2020). In rural areas where the informal agriculture sector is large, women lack opportunities for decent work and their time is primarily occupied by domestic and care work. For these reasons, women's decisions regarding labor force participation is more likely to change at the intensive margin: time spent on home production or informal work. Hence, it is important to understand the dynamics beyond formal labor market outcomes to promote FLFP in developing countries.

To address these gaps in knowledge, this study investigates how expansion of public pre-primary education affects FLFP in rural areas across various dimensions. More specifically, an increase in the number of affordable good-quality preschools in a district may affect parental decisions on preschool enrollment of their children, being a situation which is also closely related to women's care burden. To estimate these effects, it examines the sudden increase in the number of public preschools in Bangladesh that was driven by the government's massive nationalization policy between 2013 and 2014. Following this initiative, teaching jobs were regularized, a newly developed national curriculum was implemented, free education was provided for all children aged 5, and parental awareness of pre-primary education improved (Bhatta et al., 2020). It is highly likely that the variation in the number of nationalized private schools across districts was exogenous, and that the number of nationalized private schools, time, and the age of children jointly determine an individual's exposure to this policy intervention.

Using differences in time and districts, this study finds that for every additional nationalized preschool per 1,000 children, the probability of women participating in income generating activities increases by 32 percentage points for those with the youngest child aged 5, but there are no significant effects on women's working status or type of work (paid or unpaid). This study also provides evidence of changes in the gendered division of labor within households: women's share of total household time spent on domestic work decreases by 20 percentage points and the share of farming increases by 27 percentage points, while men's share of domestic work increases by 29 percentage points on average. Taken together, the findings suggest that the reduced domestic care burden of women in rural areas increases FLFP at the intensive margin, but its effect at the extensive margin is limited.

This study contributes to the broader literature on childcare and female labor. A large body of literature reveals that the provision of formal and informal childcare affects mothers' labor force participation (Lefebvre and Merrigan, 2008; Bauernschuster and Schlotter, 2015; Posadas and Vidal-Fernandez, 2013). However, many of these studies focus on the outcomes for women in urban areas where the labor market environment and household characteristics are different from those in rural areas. By contrast, this study explains the dynamics beyond labor market outcomes in rural areas by measuring FLFP across three dimensions: market, home production, and time allocation.

The remainder of this paper is organized as follows. Section II briefly describes women's status and public preschool expansion in Bangladesh. Section III reviews previous literature and Section IV describes the data. Section V discusses the identification strategy. Section VI examines the effect of the public preschool expansion on FLFP, and Section VII offers concluding remarks.

BACKGROUND

A. WOMEN IN BANGLADESH

Bangladesh is one of the countries that has made good progress on a number of gender indicators. According to a recent report on the gender gap by the World Economic Forum (2022), Bangladesh has the highest level of gender equality in South Asia and the 71st in the world. Specifically, women's level of political empowerment in Bangladesh is high and the country has achieved almost gender-equal education in primary and secondary education. In terms of economic participation, thanks to the development of readymade garment industry, FLFP has increased from 28 percent in 2002 to 38 percent in 2019 (World Bank, 2019). At the same time,

the share of female professional and technical workers increased by 5.4 percentage points, and the estimated earned income for women rose by 13 percent compared with 2021 (WEF, 2022).

However, persistent patriarchal gender norms and ongoing high gender inequalities in economic participation, access to assets, and decision-making within households hinder the empowerment of Bangladeshi women. Specifically, FLFP is still less than half that of males and approximately 41 percent of employed women are in part-time work (WEF, 2022). Furthermore, inheritance rights and access to land and non-land assets are restricted for women, reproductive autonomy is limited, and almost half of women experience early marriage and gender violence (WEF, 2022).

B. PUBLIC PRESCHOOL EXPANSION IN BANGLADESH

The Bangladeshi government has been trying to expand pre-primary education (PPE) since the early 2000s. In the 1970-80s, public primary schools provided “baby classes” for children aged 5 before the start of primary schooling at age 6, but this was spontaneous and informal (Mahmuda Akhter, 2012). The preschool enrollment rate was almost 80 percent in the late 1980s, but fell to below 20 during the first decade of the 2000s (World Bank). To regain momentum, the government issued the Operational Framework for PPE in 2008, which laid the foundation for close cooperation between the NGOs and the government. Since 2008, the number of private schools has increased substantially, and NGOs have been playing an important role in providing pre-primary education in Bangladesh, especially in regions where access to public schools is limited. More importantly, the New National Education Policy developed in 2010 formally included PPE as the first stage of education. With the aim of offering PPE to all 5-year-old children, the government started implementing an interim PPE curriculum in all government primary schools (Mahmuda Akhter, 2012).

In line with such efforts, the government set out a plan to nationalize a vast number of non-government primary schools in three phases. In the first phase, 22,981 schools enlisted on the government's monthly payment order (MPO) were nationalized from January 2013. In the second phase, 2,252 community schools and NGO schools were nationalized from July 2013. In the third phase, the government nationalized 960 schools by January 2014 (MoPME, 2013a) (Figure 1-1). One of the most salient changes caused by such nationalization was the quality of education. A hundred thousand teaching jobs were regularized during this period and teachers' salaries increased. Also, the government fully implemented a newly developed national PPE curriculum for all children aged 5. Improved job satisfaction among teachers and a structured curriculum might have affected the absenteeism of both teachers and students. Another change was the cost; the government provided free pre-primary education in public schools for all children aged 5. More importantly, parental awareness of the appropriate age for enrollment in preschools also increased substantially. Prior to nationalization, many parents thought that 5-year-old children were too young to go to school (CAMPE, 2013; BIHS, 2011, 2015).

As a result, public investment in PPE education increased markedly, the average cost of PPE education for households decreased, and the enrollment rate for children aged 5 increased, especially in rural areas. According to Bhatta et al. (2020), per child public expenditure on early childhood education rose substantially from USD 3.67 in 2013-14 to USD 11.04 in 2015-16, mainly due to the increase in teachers' salaries and teacher training. In addition, Household Income and Expenditure Survey (HIES) data reveal that the average annual expenditure on early childhood education per child for those attending public institutions decreased from BDT 2,475 in 2010 to BDT 2,134 in 2016 (Bhatta et al., 2020). According to HIES data, the share of children aged 5 who attend preschool rose to 32.7 percent in 2017 from 17.2 percent in 2010, and the

share of children aged 5 enrolled in preschools in rural areas also increased from 55 percent to 68 percent (Bhatta et al., 2020).

However, the number of nationalized preschools was disproportional across 64 districts. The intensity of the intervention was closely related to the number of registered non-government primary schools (RNGPS); 87 percent of the newly nationalized preschools (NNPS) were RNGPS, which were enlisted on the government’s MPO. In Bangladesh, the government had been selecting MPO-enlisting schools among applicants based on quality criteria to support basic salaries for teachers and employees. However, most of the RNGPS were nationalized during this period and the number of RNGPS differed across districts at the time of the policy intervention (Figure 1-2).

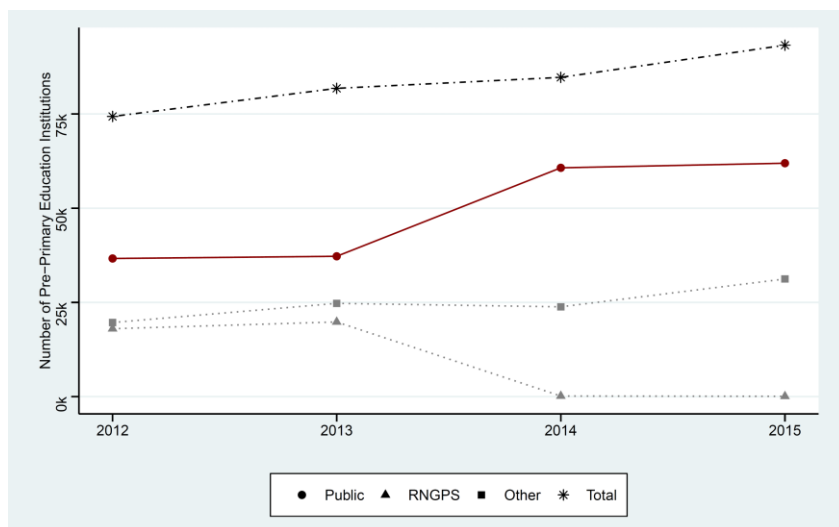


FIGURE 1-1

Number of Institutions Providing Pre-Primary Education
Sources. Annual Primary School Census (2012, 2013, 2014, 2015)

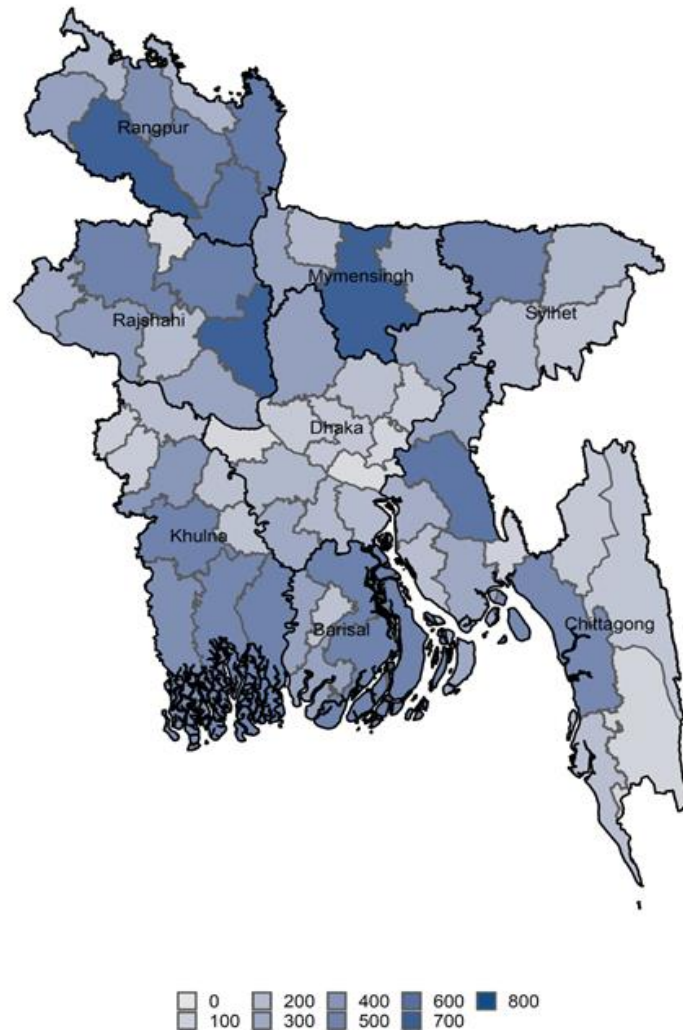


FIGURE 1-2

Distribution of Registered Non-Government Primary Schools (RNGPS) across 64 Districts in Bangladesh in 2012

Source. Annual Primary School Census (2012)

LITERATURE REVIEW

Numerous studies demonstrate that childcare is one of the significant constraints on the labor supply decision of a household and affects mothers' labor supply through a variety of channels; cost, quality, and the quantity of available childcare (Gelbach, 2002; Lefebvre and Merrigan, 2008; Bauernschuster and Schlotter, 2015). However, evidence in the context of developing

countries is less clear as differences in family type, the labor market environment, and women's status can mediate the effects of childcare burden on women's labor supply. For example, Cao (2019) reported that the effect of fertility on mothers' labor supply is limited for women in an extended family, while Agüero and Marks (2008) and Aaronson et al. (2017) found that the fertility effect is limited in low-development contexts.

Specifically, measuring female labor market outcomes at the extensive margin can be misleading in developing countries where the informal sector is large and a strong gendered division of labor exists. In general, labor outcomes at the extensive margin means changes in paid employment, while those at the intensive margin means changes in working hours or labor force participation (Blundell et al., 2011). Several previous studies have explained the gap between the extensive and intensive margins of the labor supply. For example, Cogan (1981) reveals a fixed cost of working for married women that accounts for the gap between hours of work and labor supply decision. Blau and Robins (1988) found that childcare costs affect women's decision to work or purchase childcare in the United States. However, Pimkina and de la Flor's (2020) comprehensive review of the literature on female labor force participation reveals that evidence for labor outcomes at the intensive margin remains relatively thin, especially in the context of developing countries.

Addressing this gap in knowledge, this study contributes to the previous literature by assessing the effects of the expansion of public childcare services on rural women's labor force participation at both intensive and extensive margins, as well as on intrahousehold gender dynamics.

DATA

To assess women's labor force participation outcomes, this study primarily uses data from the Bangladesh Integrated Household Survey (BIHS in 2011, 2015). BIHS is a comprehensive nationwide household survey designed by the Bangladesh Policy Research and Strategy Support Program (PRSSP), funded by USAID, and implemented by the International Food Policy Research Institute (IFPRI). The BIHS is an individual-level panel survey dataset, but this study uses it as a pooled cross-sectional dataset that excludes panel individuals to compare individuals according to the age of their children. For the main analyses, the sample is restricted to married women in rural areas aged 18-60 in households with the youngest child aged 5, making them officially eligible for public preschools.

This study employs various outcome measures to capture not only the changes in the formal or informal labor market participation at the extensive margin but also the changes in household labor force participation at the intensive margin. Specifically, it uses data on women's working status, type of work (paid or unpaid), participation in income generating activities, and share of time spent on selected activities: namely, caring for children and the elderly, farming, domestic works, working as employed.

Labor force participation, which is distinct from employment status or labor supply, generally includes people in formal or informal work as well as people who are looking for a job. In rural areas where the informal sector is large, it is important to understand the dynamics beyond the labor market outcome, i.e., employment. The BIHS questionnaire on an individual's working status measures labor force participation. It asks about individual's '*employment status in the past 7 days*', and the answers are categorized as 'not working, looking for a job, in unpaid or paid work'. Following the definition of labor force participation, this study codes these answers into

a binary variable for analyses; zero if an individual is not working, and one if looking for a job, or in unpaid or paid work. In addition, to assess the changes in the quality of work for women, this study uses the type of work (paid or unpaid) variable, which equals one if an individual works in waged, salaried or self-employment, zero if they are engaged in unpaid work¹. Participation in income generating activities asks whether an individual is *'doing any work or business that brings in cash, additional food, or allows her to accumulate assets for her household including agriculture, petty trade, money lending, and others.'* This measure captures more informal economic activities within a household, that is, home production. The time allocation measure asks about each individual's time allocated for various activities on the previous day. Relevant activities for this study include caring for children and the elderly, domestic work, farming, and working as employed. Participation in income generating activities and time allocation measures enable me to observe the changes in women's labor force participation at the intensive margin, even when there is no marginal change in the labor market outcome. Another benefit derived from using these measures is that the changes in women's labor force participation are likely to be immediately reflected in these measures. Even when there is an active labor market and opportunity for decent work, it would take time and effort for women with children to participate in the labor market, or they would simply want to work with more flexibility until their children are fully grown. The time gap between the policy and the impact would make it difficult to assess the causal relationship.

¹ To assess the changes in the women's labor force and the participation outcome at the extensive margin, this study also conducted the analyses using a dummy variable which equals one if an individual works in paid work, and zero if one is engaged in unpaid work or not working. Using this variable, this study found similar results (not reported) with the results from the analyses using the type of work (paid or unpaid) variable (Column 2 in Table 3-3).

The key independent variable is the number of government preschools per 1,000 children aged 0-10. For preschool data, this study uses data from the Annual Primary School Census (APSC) which has been conducted since 2007 by the Ministry of Primary and Mass Education (MoPME) of Bangladesh. APSC contains information on the number of preschools by different type across districts and the enrollment rate. Data on the number of children across districts is taken from the APSC and Population and Housing Census (2011) of Bangladesh.

This study also controls for individual and household level characteristics, namely age, education level, literacy, pregnancy status, breastfeeding status, household income, household head's religion, the number of household members, the number of children aged 6-10, and the number of negative events in households since 2011. At district level, it controls the number of other types of pre-primary education institutions in districts per 1,000 children aged 0-10. To test the validity of the specification, this study also uses data from the Demographic and Health Survey (DHS in 1999, 2004, 2007, 2011, 2014, 2017). Details of the data are presented in Table 1-1.

TABLE 1-1
VARIABLES

Category	Variables	Description
Labor Force Participation Outcomes	Working status (Formal/informal labor market)	4 category answers to “ <i>What was your employment status in the past 7 days?</i> ” (0: not working, 1: looking for a job, 2: unpaid work, 3: paid work) were recoded as a binary answer for the analysis (0: not working, 1: looking for a job, unpaid work, paid work)
	Paid work (Type of work)	0: unpaid, 1: daily wage/salary/self-employed
	Income generating activities (Informal sector)	Binary answers to the question “ <i>Are you now doing any work or business that brings in cash, additional food, or allows you to accumulate assets for your household?</i> ” (including agriculture, petty trade, money lending, etc.)
	Time Allocation (Share of	Individuals are asked to record a log of 21 activities undertaken in the last complete 24 hours. The time is marked in 15 min intervals. This study converts the answers

	household)	into minutes and calculates each individual's share of total household time spent on selected activities: (1) caring for children and the elderly, (2) domestic work, (3) farming, (4) working as employed activities.
Individual Variables	Age	Age
	Literacy	Literacy level is categorized as 1: cannot read and write, 2: can sign only, 3: can read only, 4: can read and write
	Education	Education level is categorized as 0: never, 1: preschool, 2: reading, 3: class 1, 4: class 2, 5: class 3, 6: class 4, 7: class 5, 8: class 6, 9: class 7, 10: class 8, 11: class 9, 12: secondary, 13: higher secondary, 14: B.A., 15: M.A.
	Loan	Individual's total amount of loan (log)
	Pregnancy status	Currently pregnant (1: yes, 0: no)
	Breastfeeding status	Currently breastfeeding (1: yes, 0: no)
	Leisure time	Time spent on activities other than (1) caring for children and the elderly, (2) domestic work, (3) farming, (4) working as employed
Household Variables	Number of family members	Number of family members
	Number of children aged 6-10	Number of children aged 6-10
	Household head's religion	Household head's religion (1: Muslim, 2: Hindu)
	Household income per member (log)	Total household income in last month divided by the number of household members
	Number of negative events since 2011	Individuals were asked whether there have been any unexpected negative economic shocks within their households since 2011. Overall, 33 kinds of shocks were specified throughout the questionnaire. This study calculated the total number of shocks.
	Female headed household	Household head is female (1: yes, 0: no)
District Variables	Number of government preschools	Number of government preschools (per 1,000 children aged 0-10)
	Number of other types of school	Number of other types of school, including non-registered non-government preschools, community schools, religious schools, NGO schools, etc. (per 1,000 children aged 0-10)
	Preschool enrollment rate	Total number of children enrolled in preschool per 100 children aged 0-5 in districts
	Number of children	Total number of children aged 0-10, 0-5

Table 1-2 reports descriptive statistics for the sample in the year 2011. The sample is restricted to married women in rural areas aged 18-60 in households with the youngest child aged 5: panel individuals are excluded from the sample. In this sample, 78 percent of women are working and 69 percent of women are participating in income generating activities. Among working women, 76 percent of women are in paid work. In fact, this is an extremely high number compared with labor force participation statistics at the country level. For example, the World Bank reports that 31.68 percent of women aged 15 to 64 supplied labor for the production of goods and services in 2011. A comparison between the same age group reveals that 68 percent of women aged 15 to 64 were working in the full BIHS sample in 2011, which is still higher. This gap implies that many unpaid workers and family workers are omitted from the labor force participation statistics. Table 1-2 also indicates that women’s time is mainly occupied by care duties and domestic work, comprising 42 and 83 percent of total household time, respectively. By contrast, women’s time spent on productive activities such as farming, and employed work comprise less than 5 percent of the household total. With regard to district-level school data, the number of schools varies by type and the preschool enrollment rate is extremely low in 2011 compared with the primary school enrollment rate.

TABLE 1-2
DESCRIPTIVE STATISTICS (2011)

	Obs.	Mean	Std.	Min.	Max.
<i>Panel A. Outcome variables</i>					
Working status	409	0.78	0.41	0	1
Paid work	319	0.76	0.43	0	1
Income generating activity	346	0.69	0.46	0	1
Children and elderly care (share)	355	0.42	0.49	0	1

Domestic work (share)	355	0.83	0.25	0	1
Farming (share)	355	0.03	0.17	0	1
Working as employed (share)	355	0.04	0.19	0	1
<i>Panel B. Individual-level variables</i>					
Age	409	33.58	9.61	18	60
Literacy	409	2.91	1.23	1	4
Level of education	409	4.78	4.47	0	15
Individual loan (log)	409	3.42	4.70	0	12.43
Pregnancy status	404	0.05	0.23	0	1
Breastfeeding status	402	0.01	0.09	0	1
Leisure time	347	898.70	132.07	585	1,440
<i>Panel C. Household-level variables</i>					
Number of household members	409	4.95	1.62	2	14
Number of children (age 6 to 10)	409	0.64	0.77	0	3
Household head's religion	409	1.14	0.35	1	3
Household income per member (log)	409	6.33	1.68	0	8.62
Negative economic shocks since 2011	409	0.46	0.50	0	1
Female headed household	409	0.10	0.29	0	1
<i>Panel D. District-level variables</i>					
Number of government schools	64	572.73	279.17	150	1,624
Number of RNGPS schools	64	281.58	169.96	28	760
Number of other schools	64	307.23	324.10	49	2,027
Pre-primary school enrollment rate	64	14.44	3.89	8.17	25.87
Primary school enrollment rate	64	98.01	3.7	78.22	99.96
Population aged 0-10	64	575,670	398,386	121,428	2,305,201

Note. Sample is restricted to married women in rural areas aged 18-60 in households with the youngest child aged 5 (panel individuals are excluded).

Table 1-3 reports the regression coefficients of the respective outcome variable on control variables for the sample in 2011. As shown, women’s pregnancy status is negatively related to the time spent on domestic work (Columns 3 and 4 in Panel A). In terms of household characteristics, the number of household members and sex of the household head are closely related to women’s labor force participation (Columns 1 and 2 in Panel B). Panel C depicts the relationship between school variables and women’s labor force participation before the intervention. The number of schools per 1,000 children is not significantly related to women’s labor outcomes in 2011, except for women’s time spent on domestic work; and the higher number of registered non-government primary schools (RNGPS) is positively related to women’s time spent on domestic work (Column 4 in Panel C). Conversely, the enrollment rate is negatively related to female labor force participation before the intervention, although the magnitude of this is relatively small (Columns 2 and 3 in Panel C).

TABLE 1-3
CONTROL CORRELATIONS (2011)

	(1) Working Status	(2) Paid Work	(3) Income Activity	(4) Domestic (min.)	(5) Farming (min.)
<i>Panel A. Individual Control Variables</i>					
Age	0.04*** (0.02)	-0.01 (0.02)	0.03 (0.02)	8.42 (5.36)	0.67 (1.25)
Age squared	-0.00** (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.11 (0.07)	-0.01 (0.02)
Literacy	0.03 (0.04)	0.04 (0.04)	0.00 (0.05)	-8.35 (11.89)	-3.63 (4.32)
Level of education	-0.00 (0.01)	-0.01 (0.01)	0.01 (0.01)	-1.18 (3.31)	1.39 (1.63)
Individual loan (log)	0.01 (0.00)	0.01 (0.01)	0.01 (0.01)	-0.55 (1.62)	0.35 (0.52)
Pregnancy Status	-0.05 (0.11)	-0.02 (0.11)	-0.03 (0.14)	-64.92** (29.89)	-5.19 (3.32)

Panel B. Household Control Variables

Number of household members	-0.04** (0.02)	0.01 (0.02)	-0.03 (0.02)	-2.26 (6.13)	-1.12 (1.69)
Number of children (age 6 to 10)	0.07** (0.03)	0.01 (0.04)	0.04 (0.04)	-8.52 (12.10)	1.92 (2.72)
Household head's religion	0.01 (0.06)	-0.10 (0.07)	0.04 (0.07)	-26.97 (23.74)	13.12 (13.41)
Household income per member (log)	0.01 (0.02)	0.03 (0.02)	-0.02 (0.01)	0.18 (4.37)	-1.12 (1.60)
Negative economic shocks since 2011	0.05 (0.04)	0.01 (0.05)	0.07 (0.05)	-8.03 (14.79)	-3.97 (4.90)
Female headed household	0.11 (0.07)	0.32*** (0.06)	0.02 (0.09)	-2.89 (26.28)	-9.25 (6.76)

Panel C. District-level Variables

Number of government schools (per 1,000 children)	-0.04 (0.09)	0.02 (0.10)	0.07 (0.11)	-17.67 (34.64)	-1.03 (4.51)
Number of RNGPS schools (per 1,000 children)	0.16 (0.10)	0.07 (0.11)	0.02 (0.12)	66.27* (33.93)	-2.65 (11.66)
Number of other schools (per 1,000 children)	-0.05 (0.14)	-0.10 (0.15)	-0.02 (0.17)	38.22 (33.55)	-14.34 (11.80)
Pre-primary school enrollment rate	-0.01 (0.01)	0.01 (0.01)	-0.02** (0.01)	-0.62 (3.11)	1.03 (1.36)
Primary school enrollment rate	0.00 (0.01)	-0.01** (0.01)	0.01 (0.01)	0.45 (2.63)	-0.16 (0.70)

Note. Sample is restricted to married women in rural areas aged 18-60 in households with the youngest child aged 5 (panel individuals are excluded). Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

IDENTIFICATION STRATEGY

A major challenge in estimating the causal relationship between FLFP and public preschool is possible endogeneity between the two variables. For example, higher FLFP in a district may induce a higher demand for public childcare; thus, the government may provide more public preschools in the district. On the other hand, a large number of good quality private preschools may promote FLFP, while the number of public preschools is expected to be low. To reduce such bias, this study adopts a differences-in-differences strategy (DD). This uses the differential

increase in public preschools across 64 districts between 2013 and 2014 as a source of variation in the intensity of the intervention. Specifically, time, district, and the age of children in a household jointly determine an individual's exposure to the policy intervention. The sudden increase in public preschools in a district was mainly due to the nationalization of pre-existing registered non-government primary schools (RNGPS) in the region. The government's RNGPS registration criteria primarily focused on the quality of schools and teachers, which was possibly independent of women's labor force participation in the region. The first estimation model is specified as follows:

$$(1) \quad LFP_{ijdt} = \beta_0 + \beta_1 PUB_{dt} + X_{ijdt}\delta + \mu_d + \gamma_t + \epsilon_{ijdt}$$

where i denotes individual, j denotes household, d denotes district, t denotes years 2011 and 2015 (64 districts, 2 child age group, 2 years). The dependent variable LFP_{ijdt} indicates an individual's labor force participation outcome measured at different levels: working status, type of work (paid or unpaid), participation in income generating activities, and time allocation. PUB_{dt} denotes the intensity of the intervention; namely, the number of government preschools per 1,000 children in district d in year t . X_{ijdt} is a vector of control variables. To control for any unobserved district and time specific effects, this model also includes the terms for district-fixed effects μ_d and time-fixed effects γ_t .

As a falsification test, this study estimates the effect of public preschool expansion on women with the youngest child aged 13. Because a child aged 13 is expected to have graduated from primary school, no significant effects are expected. To test the validity of the specification, this study conducts an event study analysis using the DHS dataset which provides data on women's working status across longer time periods.

RESULTS

A. PRESCHOOL ENROLLMENT RATE

Before estimating the effects of public preschools on women's labor force participation, this study tests whether the intervention increased the preschool enrollment rate differentially across districts. Firstly, this study counted the number of children entering preschool at ages 4, 5, 6, and 7 using the cohort aged 5 to 14 in the BIHS dataset in 2015. Figure 1-3 reveals that the preschool enrollment of five-year old children increased strongly after the intervention compared with other age groups.

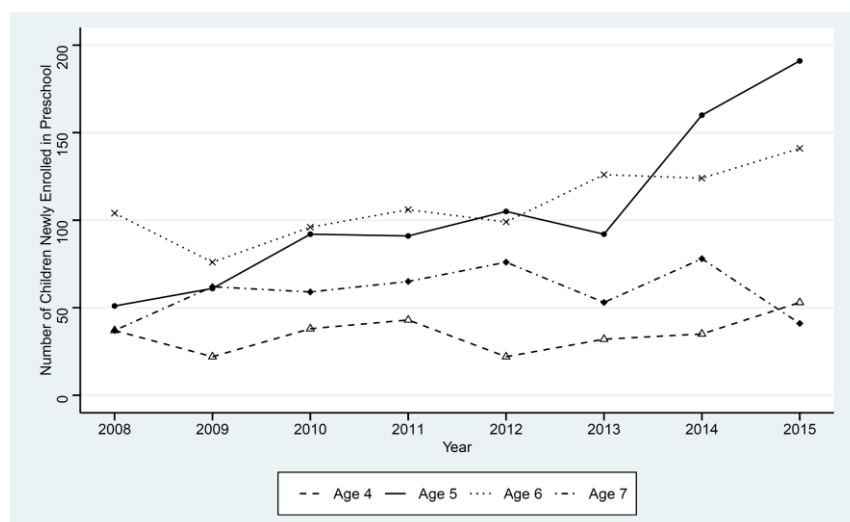


FIGURE 1-3

Number of Children Enrolled in Preschool by Entrance Age

Source. Bangladesh Integrated Household Survey (2015)

Note. The number of children entering preschool at ages 4, 5, 6, and 7 were counted using the cohort aged 5 to 14 in 2015.

Figure 1-4 presents the trends in total preschool enrollment and enrollment by different types of school. Following the intervention, enrollment in government preschools increased noticeably, while enrollment in RNGPS decreased. However, the increasing trend in total enrollment is

rather smooth, which implies possible trade-offs in preschool enrollment across different types of school and age groups. In addition, APSC (2015) notes that total preschool enrollment declined slightly in 2015 due to a decrease in the population cohort aged 4-5 years and overall downward trends in the national population.

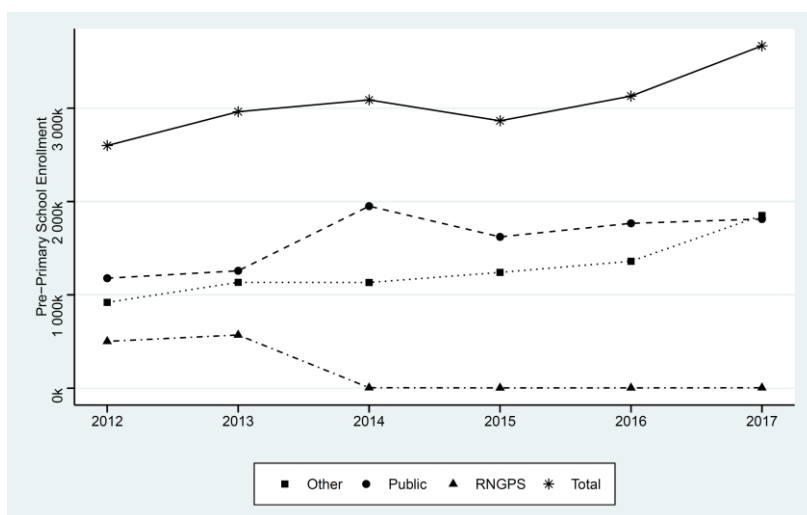


FIGURE 1-4

Preschool Enrollment by Types of Institution

Sources. Annual Primary School Census (2012, 2013, 2014, 2015)

To estimate differential changes in preschool enrollment rate across districts, the model is specified as follows:

$$(2) \quad Enrolrate_{dt} = \beta_0 + \beta_1 PUB_{dt} + Other_{dt} + \mu_d + \gamma_t + \epsilon_{dt}$$

where $Enrolrate_{dt}$ denotes the preschool enrollment rate of children aged 0 to 5, PUB_{dt} and $Other_{dt}$ are the number of public preschools and other type of preschools per 1,000 children, respectively. $Enrolrate_{dt}$ is calculated for children aged 0 to 5 because preschool enrollment mainly increased for children aged 5. The results in Table 1-4 indicate that for every additional

public preschool per 1,000 children, preschool enrollment rate increases by 2.25 percentage points.

TABLE 1-4
PUBLIC PRESCHOOLS AND PRESCHOOL ENROLLMENT RATE

	Preschool Enrollment Rate
<i>Public Preschool</i>	2.25* (1.14)
Observations	128
Adjusted R^2	0.75
Fixed Effects (district, time)	YES

Note. District clustered standard errors are in parentheses. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

B. MAIN RESULTS

This section presents the main results. Using equation (1), this study first estimate the effects of public preschool expansion on women in the treatment child age group, i.e., married women in rural areas aged 18-60 in households with the youngest child aged 5. Table 1-5 presents the differences-in-differences coefficient β_1 , and each column shows estimates for different FLFP outcomes. The results reveal that for every additional nationalized preschool per 1,000 children, the probability of women participating in income generating activities increases by 32 percentage points (Column 3 in Panel A). Conversely, no statistically significant effects on rural women's labor force participation in more formal labor market dimensions (Column 1, 2) were found. The results suggest that the provision of public preprimary education increases FLFP at the intensive margin. Specifically, it increases participation in income generating activities within households,

but does not lead to any changes in labor market participation. Panel B reveals no significant effects of public preschools on men’s labor force participation outcomes.

TABLE 1-5
EFFECT OF PUBLIC PRESCHOOLS ON WOMEN’S WORKING STATUS

	(1) Working status	(2) Paid Work	(3) Income Generating Activity
Panel A. Women			
Public Preschool	0.05 (0.11)	0.16 (0.12)	0.32* (0.18)
Observations	715	588	607
Adjusted R^2	0.14	0.13	0.21
Fixed Effects (district, time)	YES	YES	YES
Panel B. Men			
Public Preschool	-0.02 (0.03)	-0.02 (0.04)	- -
Observations	553	543	-
Adjusted R^2	0.02	0.18	-
Fixed Effects (district, time)	YES	YES	-

Note. Sample is restricted to married women/men in rural areas aged 18-60 in households with the youngest child aged 5 (panel individuals are excluded) for Panel A and Panel B, respectively. District clustered standard errors are in parentheses. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

To further investigate the changes in FLFP within households, this study estimates how women’s and men’s share of time spent on household activities changes as the number of public preschool increases. Table 1-6 presents the regression results for different activities in each column. Following the intervention, women’s share of total households’ time spent on domestic work

decreases by 20 percentage points for every additional public preschool per 1,000 children (Panel A, Column 2, 3), whereas the share of time spent on farming increases by 27 percentage points on average. By contrast, men’s share of time spent on domestic work increases by 29 percentage points on average. However, the distribution is right-skewed, suggesting the result could be driven by a number of outliers. To address this concern, this study tests the results using the data Winsorized at 95 percentiles, but the coefficient remains the same with higher statistical power (significant at the 1 percent.)

TABLE 1-6
EFFECT OF PUBLIC PRESCHOOLS ON WOMEN’S TIME ALLOCATION

	(1) Care Work (share)	(2) Domestic Work (share)	(3) Farming (share)	(4) Work as Employed (share)
Panel A. Women				
Public Preschool	0.12 (0.17)	-0.20** (0.09)	0.27*** (0.09)	0.08 (0.07)
Observations	521	521	521	521
Adjusted R^2	0.15	0.26	0.29	0.14
Fixed Effects (district, time)	YES	YES	YES	YES
Panel B. Men				
Public Preschool	0.04 (0.09)	0.29** (0.11)	-0.22 (0.18)	-0.29 (0.23)
Observations	299	299	299	299
Adjusted R^2	-0.07	0.31	0.04	0.07
Fixed Effects (district, time)	YES	YES	YES	YES

Note. Sample is restricted to married women/men in rural areas aged 18-60 in households with the youngest child aged 5 (panel individuals are excluded) for Panel A and Panel B, respectively. District clustered standard errors are in parentheses. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

As a falsification test, this study estimates the effects of public preschool expansion on women in the control child age group, i.e., women in households with the youngest child aged 13. Because the official graduation age of primary schools in Bangladesh is 11 (entrance at age 6), the labor force participation of women with children aged above 11 would not have been greatly affected by the increased number of public preschools. Women with children aged 13 are used as a comparison group given the repetition rate (6.2 percent in 2015) and gaps in gross intake rate and net intake rate; gross intake rate counts the number of students in primary schools regardless of age (109.2 percent in 2015), while net intake rate counts the number of students enrolled at the specified legal age (97.91 in 2015). Table 1-7 presents the effects on women with children in this age group. As predicted, no statistically significant effects are found, except for women’s share of total household time spent working as employed, which decreases by 19 percentage points. However, the result is possibly driven by outliers as the statistical significance disappears with the data Winsorized at 95 percentiles (coefficient becomes -0.07 and insignificant).

TABLE 1-7

FALSIFICATION TEST: EFFECT OF PUBLIC PRESCHOOLS ON FEMALE LABOR FORCE PARTICIPATION IN THE CONTROL CHILD AGE GROUP

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Working Status	Paid Work	Income Activity	Care Work (share)	Domestic Work (share)	Farming (share)	Work as Employed (share)
Public Preschool	0.17 (0.16)	0.26 (0.17)	0.23 (0.16)	0.08 (0.29)	-0.16 (0.15)	-0.03 (0.20)	-0.19** (0.09)
Observations	335	278	295	234	234	234	234
Adjusted R^2	0.15	0.12	0.18	0.06	0.10	0.30	0.27
Fixed Effects (district, time)	YES	YES	YES	YES	YES	YES	YES

Note. Sample is restricted to married women in rural areas aged 18-60 in households with the youngest child aged 13 (panel individuals are excluded). District clustered standard errors are in parentheses. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

C. SPECIFICATION CHECKS

The identification strategy assumes that the policy intervention was exogenous to FLFP. Under this assumption changes in individuals' labor force participation outcomes across districts would not have been systematically different without the intervention. Furthermore, no varying time- or district- specific effects correlated with the intervention should be omitted.

The main source of variation in the number of newly nationalized public preschools (NNPS) was the different number of MPO registered RNGPS across districts. If the number of RNGPS was correlated with the FLFP (even before the intervention) in a specific way that is related to such intervention; for example, the positive relationship between the FLFP and the number of RNGPS before the nationalization, the assumption would not hold. According to the government's principles for enlisting a school to the MPO, the main concern was the quality of the schools and teachers. The number of non-government primary schools in a region could be somehow related to the demand (but is more likely to be related to the number of children than FLFP), but whether it can be registered to the MPO (i.e., registered as an RNGPS school) was somewhat independent from FLFP in the region. To test this, I compare the coefficients of the NNPS before the intervention using the Demographic and Health Survey (DHS) dataset. The DHS dataset provides similar information on women's working status but provides more waves: 1999, 2004, 2007, 2011, 2014, 2017. The model is specified as follows:

$$(3) \quad LFP_{idt} = \beta_0 + \sum_{l \in S} (NNPS_{d,2015} \times AGE5_l) \beta_{1l} + X_{idt} \delta + \mu_d + \gamma_t + \epsilon_{idt}$$

$$S = \{1999, 2004, 2007, 2014, 2017\}$$

where LFP_{idt} denotes binary working status, $NNPS_{d,2015}$ denotes the number of nationalized preschools in district d as of 2015, $AGE5_l$ is a dummy variable indicating whether the youngest child is aged 5 in year l . In this analysis, individuals whose youngest child is aged 5 in year 2011 are the baseline group and omitted from the regression. Because NNPS were either RNGPS or other types of private preschools before nationalization, the coefficient β_{1l} measures the effect of pre-existed RNGPS and other private preschools on the labor force participation of women with the youngest child aged 5 for $l < 2014$ and the effect of nationalized preschools on FLFP of the same age group for $l \geq 2014$. This study uses the number of NNPS because the number of preschools by type and district is not available for 1999, 2004, and 2007. β_{1l} is plotted in Figure 1-5 and a 95 percent confidence interval is indicated using dashed lines. Before the intervention, the coefficients are approximately zero, but this increases and becomes significantly different from zero in 2017. The result of this visual analysis implies that the number of RNGPS and other private preschools had no effect on FLFP before the intervention, and a positive effect on FLFP after nationalization.

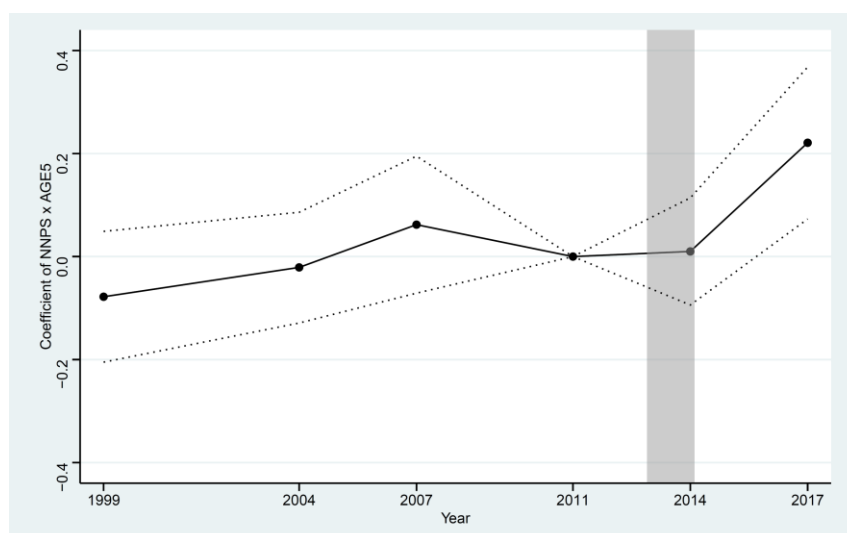


FIGURE 1-5

Coefficients of the Interactions:

Number of Newly Nationalized Primary Schools (NNPS) * AGE5 by Year

Sources. Data on the number of nationalized primary schools, primary school, and pre-primary enrollment is taken from the Annual Primary School Census (2015). Data on working status and individual control variables are taken from the Demographic and Health Survey (1999, 2004, 2007, 2011, 2014, 2017)

Another concern is the ‘pure’ treatment effect of public preschools. Firstly, other types of school might have affected FLFP as they have been playing a substantial role in providing pre-primary education in Bangladesh. Their identification would be threatened if they affected FLFP in relation to the intervention. To address this concern, This study controls the number of other types of school. Secondly, part of the effect may be due to the increased number of primary schools, not pre-primary schools, as the treated child age group includes children aged 6 (official public primary school entrance age). However, it is expected that the impact from the primary schools would not be large because the primary school enrollment and intake rate was already high in 2012-2014 (gross intake rate was 105.80 in 2012 and 108.70 in 2014; APSC). Also, Heckman (1974) reported that the number of children aged above 5 does not have a significant impact on mothers’ labor supply decisions. Nevertheless, this study controls the number of children aged 6-10 to reduce any confounding effects.

CONCLUSION

In addition to expanding early childhood education, the Bangladeshi government’s massive preschool nationalization policy reduced women’s domestic care burden and increased FLFP in rural Bangladesh. Using the geographic variation in preschool nationalization, this study finds that each newly nationalized preschool per 1,000 children led to an average increase in the probability of women participating in income generating activities by 32 percentage points. It

also finds evidence of changes in the gendered division of labor within households: women's share of total household time spent on domestic work decreased by 20 percentage points and the share of farming increased by 27 percentage points on average, while men's share of domestic work increase by 29 percentage points. To address potential endogeneity due to selection bias, this study conducted several tests. Results from falsification tests using a control group support the robustness of the estimated effects on the women. Several specification checks also support the validity of the estimation.

By examining FLFP across various dimensions, this study partly explains the mixed evidence from previous studies, especially in the context of developing countries. Reduced domestic care time may not directly lead to an increase in women's labor supply at the extensive margin, but it still increases FLFP at the intensive margin. Although this study focuses on women's labor force participation at individual and household level, increased FLFP may have a broader impact on women's empowerment, and the welfare of the marginalized population and socio-economic development of the country. Specifically, Komatsu et al. (2018) found that an increase in women's farming time in poor households led to better health outcomes for women and children.

Female labor is an important source of income for a household and a valuable human resource for the national economy. Over the past few decades, a large number of developing countries have invested in girls' education and significantly improved gender parity in education. However, many still have some way to go to fully realize its gain: namely, higher rates of return to education for women. To maximize the returns on investment in girls' education and household welfare, it is important to promote FLFP by sharing women's domestic care duties. However, the findings in this study do not necessarily imply the "exclusive" role of public sectors in providing formal

childcare. Instead, improving its quality and expanding its coverage in partnership with private sectors in the community appears more desirable.

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CHAPTER 2

MOBILE FINANCIAL SERVICE AND FEMALE EMPOWERMENT: EVIDENCE FROM THE PRIMARY EDUCATION STIPEND PROGRAM IN BANGLADESH

INTRODUCTION

In several developing countries, women in rural areas usually have limited access to financial services due to either geographical barriers or gender norms. To address this concern, many countries in recent years have expanded the mobile financial service (MFS) which enables easier access to financial services regardless of geographical distance and gender. Accordingly, an increasing number of governments and donors are adopting the MFS in social programs, such as cash transfer or microcredit programs, which in many cases are directed at women. In traditional cash transfer programs, women often have difficulties in traveling to collect the money or may have limited control over the money as it is easily visible to other family members. By contrast, in mobile cash transfer programs, women do not need to travel and can control the money more easily as they directly receive it to their bank accounts. Yet there remains some way to go to take full advantage of this modern technology. Specifically, high gender inequality in digital access is one of the major obstacles to reaping the benefits of the MFS. In Bangladesh, approximately 39 percent of women aged above 15 have their own cellphone and this number is only half that of men (BIHS, 2018). Consequently, only 11 percent of women have ever used a cellphone or

internet to access an account, while 33 percent men have (World Bank, 2017). In a context where an individual's digital access is limited either physically or non-physically, the welfare effects of adopting the MFS are expected to be restricted. On the contrary, the MFS could place more constraints on access to cash or accounts for women without digital access.

This study examines how adopting the MFS in a social cash transfer program differentially affects women's economic empowerment according to personal cellphone ownership. To estimate the effect, this study investigates a policy event in Bangladesh in 2017; where the Bangladeshi government adopted a mobile cash transfer scheme for the Primary Education Stipend Program (PESP) to improve its efficiency. The assignment of households to the program and time jointly determines an individual's exposure to the policy intervention. Using additional differences in personal cellphone ownership, this study finds that women who had a personal cellphone at the time of MFS adoption (mobile group) had more control over the stipend: women's expenses for private teaching, textbooks, and stationery for child education increased 113 percent more than for women who did not have a personal cellphone (no-mobile group). This study also suggests that after the change in the stipend payment scheme, the mobile group women felt more satisfied with their power to make important decisions than no-mobile group women. To address potential endogeneity concerns, this study conducts several specification checks using non-participating mothers and pre-intervention period samples and proposes that this result is not driven by the effect of the cellphone itself (network, information, wealth, etc.) or different baseline characteristics, but that personal cellphone ownership affected women's accessibility to the stipend in relation to the adoption of the MFS.

This study contributes to the broader literature on financial inclusion and women's economic empowerment. A plethora of studies have revealed that financial inclusion empowers an individual through saving, payments, transfer, and credits (Dupas and Robinson, 2013; Cook and McKay, 2015). However, there is relatively thin empirical evidence for the effects of the MFS, especially in a context where individuals have limited access to mobile devices. Aker et al. (2016) found that a mobile cash transfer program had a positive effect on household food diversity in Niger, but in this case mobile devices were provided to the participants. Gelb et al. (2019) surveyed 100 mothers in PESP participating households in the Chuadanga district in Bangladesh to estimate the effect of the MFS on mothers. This study empirically examined the effect of the MFS at a nationwide level focusing on women's digital access. It also adds to evidence of women's empowerment and intrahousehold resource allocation (Anderson and Baland, 2002; Duflo, 2003; Schaner, 2011).

The remainder of this paper is organized as follows. Section II describes the PESP program in Bangladesh. Section III summarizes relevant studies and Section IV describes the conceptual framework. Section V discusses the identification strategy and section VI describes the data. Section VII discusses the results and specification checks, and Section VIII offers concluding remarks.

BACKGROUND

The Primary Education Stipend Program (PESP) has a long history dating back 30 years and developed into its present form in 2002 (DPE, 2013). The program provides BDT 100 per month to selected poor families, conditional on children's school attendance. The cash amount has not changed since 2002, which was equivalent to 7kg of rice in 2003 but dropped to 2kg in 2015.

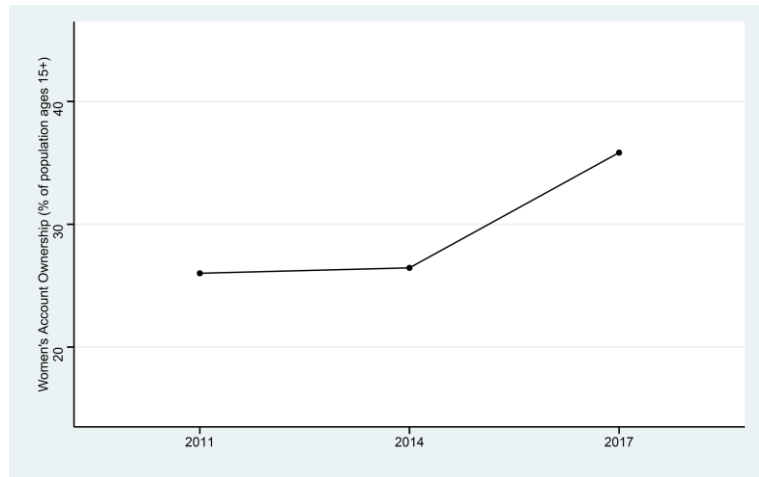
Although the value of the stipend has depreciated substantially, its positive impacts seem to have endured; school attendance increased, necessary education expenditures became affordable, and dropout rates decreased (DPE, 2013). According to a recent survey, recipients use the stipend mainly for schooling related expenses such as stationery, private tutoring, guidebooks, and tiffin (Gelb et al., 2019).

Beneficiaries are first selected by the school committee and approved by the local government. To identify them, five main criteria are considered in a composite manner: (1) insolvent female-headed households; (2) low-income occupations such as day laborer, fishermen, and artisans; (3) landlessness; (4) insolvent ethnic minorities; (5) students suffering from disabilities (DPE, 2013). The government designated the mothers of children as the persons authorized to receive the cash for the purpose of empowering and involving mothers in child education (DPE, 2013). Until 2017, the stipend was distributed to mothers in cash through designated banks and schools on a quarterly basis.

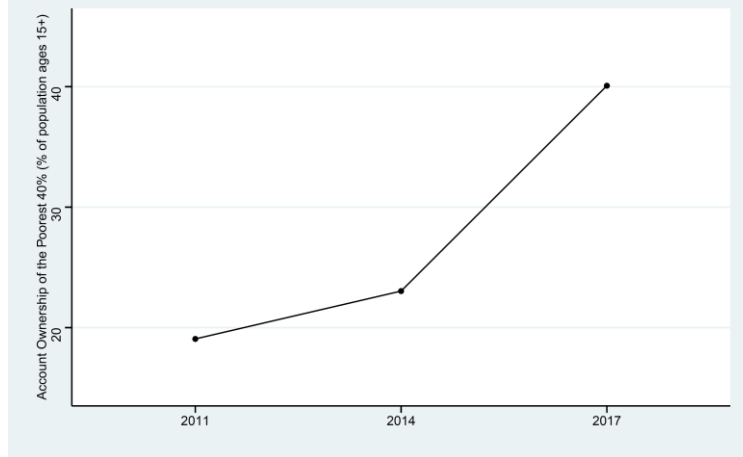
In June 2017, the government changed the stipend payment scheme from direct cash payment to mobile cash transfer to reduce inefficiencies and administrative costs in cash disbursement. For example, mothers often missed collection on the appointed day, sometimes the bank delayed the disbursement, and travel and opportunity costs were too high for mothers to collect the money, as were the administrative costs of teachers and banks (DPE, 2013). The government directly transferred the cash to mothers' mobile bank accounts through SureCash, which is a mobile financial service platform providing transfer and payment services that is operated by a government-owned bank. As of 2016, SureCash was partnered with 6 banks, namely, Rupali Bank Limited, First Security Islami Bank Limited, Bangladesh Commerce Bank Limited, Jamuna

Bank Limited, National Credit & Commerce Bank Limited, and National Bank Limited (USAID, 2016). Thus, all mothers selected for the PESP program had to have a bank account to receive the stipend. However, only 31 to 36 percent women had an account at the time of the program change (Gelb et al., 2019; World Bank, 2017). Therefore, it is expected that mothers' account ownership increased notably during this period, along with households' MFS usage (Figure 2-1, 2-2). In general, opening an account requires a certain level of deposit, which could be unaffordable for the beneficiaries. However, the beneficiaries were able to open bank accounts with low upfront costs (e.g., No-frills account) and encouraged to use the MFS (e.g., mobile payments for bills, merchants, public education expenses, individual transactions, cash in and out, etc.) as the government's mobile cash transfer program was implemented.

The change in the PESP payment scheme can reduce mothers' transaction costs for the stipend and promote access to the MFS, but this may depend on an individual's digital access. Previously, distance to designated schools or banks was the most critical transaction cost that hindered mothers from collecting the stipend on time and using financial services. After the change in the PESP payment scheme, mothers who have a cellphone within their households can easily access their mobile bank account using dials (USSD menu) or the SureCash mobile application. However, mothers who do not have access to a cellphone must visit a bank agent to withdraw the money, which may increase the transaction costs. According to Gelb et al. (2019), SureCash was a less prominent MFS provider in 2017, and its agent network density was rather thin at that time. In fact, approximately 25 percent of surveyed mothers in 100 households answered that not having a cellphone made it difficult for them to use SureCash, and 11 percent of mothers who lived more than one kilometer away from the nearest SureCash agent felt the new system was worse than before (Gelb et al., 2019).



(a) Women's Account Ownership (% of population aged 15+)



(b) Account Ownership of the Poorest 40% (% of population aged 15+)

FIGURE 2-1

Account Ownership of Women and Poor Population

Source. World Bank (2019)

Figure 2-1(b) presents the changes in account ownership in Bangladesh. Women's account ownership increased substantially in 2017, and the change was more dramatic for the poorest 40 percent of population, and it is possible that their characteristics are expected to be similar to those of PESP program participants.

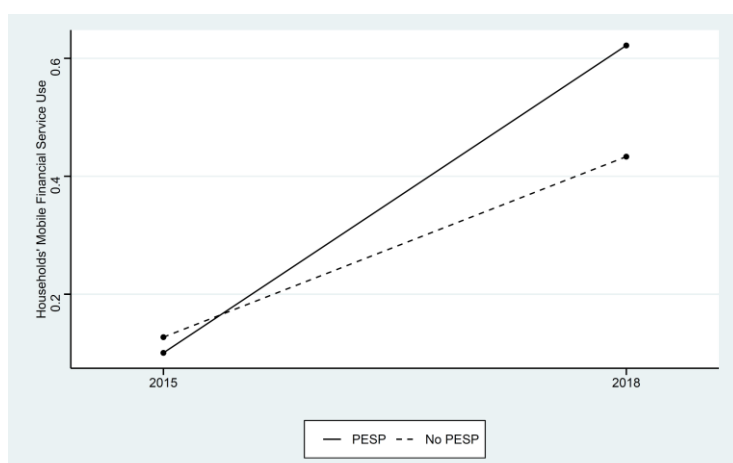


FIGURE 2-2

Households' Mobile Financial Service Usage by PESP Participation

Sources. Bangladesh Integrated Household Survey (2015, 2018)

Figure 2-2 depicts the changes in households' mobile financial service usage from 2015 to 2018. The MFS usage of PESP program participating households increased markedly compared with non-PESP households.

LITERATURE REVIEW

Adopting the MFS in social cash transfer programs can affect women's empowerment by expanding financial inclusion, which is defined as having access to financial products and services such as transactions, payments, savings, credit, and insurance (World Bank, 2022). Specifically, the government's mobile cash transfer can facilitate the opening of bank accounts and financial inclusion of beneficiaries; mostly poor rural people who were previously unbanked, either because of the cost (upfront, transaction) or lack of incentives (see also Morawczynski and Pickens, 2009). A large number of studies have reported that financial inclusion has positive effects on women's empowerment and development (Duflo, 2012; Dupas and Robinson, 2013; Prina, 2015). The benefits of financial inclusion can work in two ways; by increasing individuals' control over income and by expanding financial resources and choices.

Firstly, cash transfer through bank accounts can increase individuals' control over their income. A bank account is an essential medium for delivering financial services; at the same time, its basic function of safekeeping money is also important for individuals' economic empowerment. The money in a bank account gives clear ownership and is less visible to other people, who may make an inappropriate demand on the money, than cash in hand. Previous studies suggest that social pressure to share own's income with relatives is high in poor communities as they would otherwise face social sanctions (Barr and Stein, 2008; Di Falco and Bulte, 2011). Against this backdrop, several studies reveal that the visibility or observability of money affects individuals' consumption behaviors and control over the income within households (Anderson and Baland, 2002; Ashraf, 2009; Schaner, 2011; Boltz et al., 2016; Jakiela and Ozier, 2016). For example, Jakiela and Ozier (2016) conducted a lab experiment to test the economic impacts of social pressure to share income among relatives in rural Kenya and found that women whose kin can observe their income directly exhibit higher "willingness to pay" to conceal their initial endowment. Other previous studies have reported that observability of income is especially important for women in developing countries, whose bargaining power within a household is relatively low. For example, Schaner (2011) conducted a field experiment and found that women with low bargaining power were less likely to use an account with an ATM card, which is more easily observable and accessible by other family members, while men more likely to actively use such an account.

Secondly, the government's mobile cash transfer can empower women by expanding individuals' financial resources and choices. It is generally agreed that financial services (saving, loan, transaction/payments, insurance) can promote individuals' investment in education, health, business, and thus help poor people to escape the poverty trap in the long term (Beck et al., 2007;

Demirguc-Kunt et al., 2017; Banerjee et al., 2019). For example, Brune et al. (2016) found evidence to suggest that increased savings translated into increased agricultural output and household expenditure for farmers in Malawi. Moreover, evidence that access to microcredit expands individuals' freedom of choice and business scale though a transformative effect (i.e., poverty reduction, substantial improvements in living standards) is thus far limited (Banerjee et al., 2015; Banerjee et al., 2019). Transaction and payments through formal financial institutions are also helpful for women who have no collateral or credit records. In Kenya, M-Shwari, which is a saving and loan account leveraging penetration of mobile wallet and data, offers loans to its customers using an individual's mobile transactions and payment records (Cook and McKay, 2015). However, the linkage between having access to financial services (i.e., having an account) and benefitting from the services is not obvious. For example, Prina (2015) reported positive effects of saving accounts on household risk management, health and educational investment, and subjective financial well-being for female household heads, while Dupas et al. (2018) found no evidence of increased savings or investments due to an extended bank account when high transaction costs exist.

Furthermore, a substantial number of studies have shown that women's control over income and economic empowerment has greater development benefits, such as higher spending on nutritious food, health, and child education (Thomas, 1990; Duflo 2003). Duflo (2012) states that intrahousehold resource allocation and consumption patterns can be gender-biased depending on each member's earnings, bargaining power, and information sets. For example, Duflo and Udry (2004) reported that increased income from women's agriculture production leads to an increase in education and food expenditure, but not for private goods such as alcohol and tobacco. In this context, several development programs, such as microcredit or cash transfer programs, target

women as recipients as they expect that they will invest the money for their children and family.

To summarize, mobile cash transfer programs can expand women's financial inclusion, which may increase their economic empowerment and lead to better development outcomes, but this rests on the premise that the MFS reduces the transaction costs for women using financial services. What if a woman does not have a mobile device to access her account? Mobile money transfer may increase the costs for recipients who are unable to use cellphones or collect the money themselves (MacAuslan,2010). However, there is limited empirical evidence on the effects of mobile cash transfer, especially in cases where people have limited digital access. Aker et al. (2016) conducted a randomized experiment in Niger to assess the impacts of a mobile cash transfer program and found that mobile cash transfer reduces administrative costs and strengthens women's economic empowerment while improving household food diversity. The authors were able to distinguish the effects of mobile cash transfer from the effects of the cellphone itself (e.g., information, network). However, the effects of the mobile cash transfer program on people who do not have any mobile devices could not be assessed as digital devices or cellphones were provided to all participants in mobile cash transfer treatment arms. Gelb et al. (2019) conducted a qualitative study on the change from direct cash payment to digital payment in the Bangladeshi government's PESP program. The authors highlight the importance of digital literacy among the beneficiaries. For instance, 15 percent of surveyed mothers in 100 households found the digital payment to be worse than before, mainly because they cannot read SMS and have difficulties in withdrawing the money. To address this gap in knowledge, this study contributes to the previous literature by assessing the potential exclusionary effects of the expansion of mobile based financial services and cash transfer programs for women who have limited digital access in the developing world.

CONCEPTUAL FRAMEWORK

As discussed in Section III, Bangladeshi government's new stipend payment system can enhance women's economic empowerment and development outcomes by expanding their financial inclusion and strengthening their control over income. Firstly, a stipend payment through the mother's bank account may curb impulse consumption and increase savings. Also, for mothers whose husband is living apart from their family, a mobile bank account makes it easier for them to receive remittances. For example, Jack and Suri (2014) assert that mobile money in Kenya increases remittances and smooths consumption of user households. Furthermore, increased banking and transaction records may enable mothers to accumulate credit, which provides them with easier access to other financial services, including loans and insurance. Secondly, mobile cash transfer can promote women's economic empowerment by giving them more control over their income. This is because money in the account is less observable to other family members and affords more legitimate ownership than cash in hand. In addition to the stipend, women can use the newly created account to hide other sources of income. Having more control over their money can increase economic empowerment. Thirdly, decreased observability and increased control over the money can affect the intrahousehold resource allocation. Numerous studies have revealed that women and men have different consumption preferences and women are more likely to spend the money on family health and children's education (see Duflo, 2012); therefore, women's increased power to control income can raise household expenditure on areas preferred by women.

However, the effects are expected to differ among program participating mothers according to cellphone ownership. If mothers have limited access to their account due to physical or non-physical constraints, such as lack of a personal cellphone, limited digital literacy, and distance

from bank agents, then the effects of the MFS on their control over their income and financial inclusion can be limited. As Gelb et al. (2019) highlighted, digital literacy such as an ability to read and write SMS was important for ensuring mothers' satisfaction with the new system. Cellphone ownership is closely related to such digital literacy as well as the transaction costs of using financial services, but only 39 percent of women aged above 15 owned a cellphone as of 2018 (BIHS, 2018). Specifically, personal cellphone ownership is closely related to the observability of income, which is important for women's control. If a woman does not have a personal cellphone but other family members do, it is likely that other members will access her account. At the same time, whether any family member uses the MFS is also an important factor that can affect the observability of the money. If any member uses the MFS, the money in a woman's account can be more easily observed or transferred to another member's account depending on the mother's bargaining power within the household. Taken together, cellphone ownership among mothers is an important factor that can mediate the effect of the MFS, as well as cellphone ownership by other family members and MFS usage.

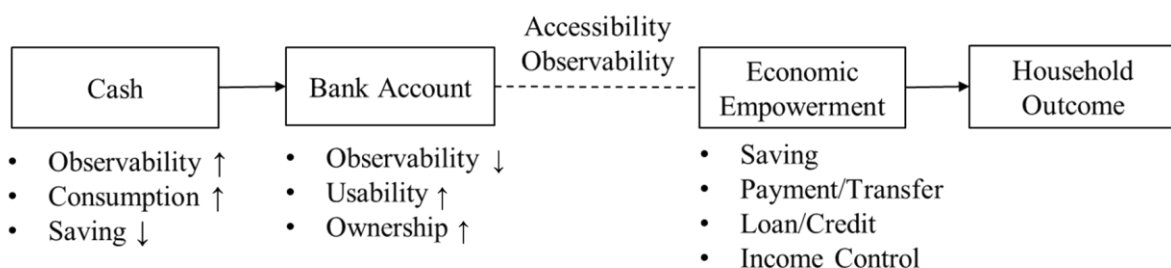


FIGURE 2-3

Conceptual Framework

IDENTIFICATION STRATEGY

This study adopts a differences-in-differences strategy (DD) to assess differential effects of the intervention based on accessibility to an account, using differences in time and personal cellphone ownership as the source of variation. A major challenge in estimating the causal relationship between the MFS and women's empowerment is potential endogeneity due to selection bias. For example, cellphone ownership itself may reflect a woman's bargaining power within the household or empowerment. The DD estimation method can reduce such bias as it only uses variation at the time of policy change to estimate the effect. To address the concern of potential endogeneity due to selection bias, this study also controls for observed and unobserved individual characteristics using an individual panel dataset. For the simplicity of analysis, this study first restricts the sample to the treated individuals, i.e., mothers of children aged 6-10 (primary school age in Bangladesh) who participated in the PESP program in both pre- and post- periods (2015 and 2018). The first estimation model is specified as follows:

$$(1) Outcome_{ijt} = \alpha_0 + \alpha_1 Mobile_i + \alpha_2 Post_t + \beta_1 Mobile_i \times Post_t + X_{ijt} \delta + \mu_i + \epsilon_{ijt}$$

where i denotes individual, j denotes households, and t denotes years 2015 and 2018. The dependent variable $Outcome_{ijt}$ denotes an individual's financial inclusion outcomes (savings, loans), income control and household resource allocation measures (education expenses, private expenses), and an empowerment measure (perceived decision-making power). $Mobile_i$ is a dummy variable indicating an individual had a personal cellphone in year 2018 and $Post_t$ is a dummy variable indicating the year 2018. X_{ijt} is a vector of control variables, including other family members' cellphone ownership and household MFS usage. To control for any unobserved individual specific effects, this model includes the term for individual-fixed effects μ_i .

To test the validity of the specification, several falsification tests were conducted with various comparison groups who possibly might not have been affected by the program: Mothers of children aged 6-10 who had not participated in the PESP program in both years and mothers of children aged 6-10 who had participated in the PESP program in the years before the intervention (2011-2015). As another specification check, this study estimates differences-in-differences-in-differences (DDD) coefficients using the full sample of mothers of children aged 6-10 who had and had not participated in the PESP program in both years, respectively. The DDD estimation model is specified as follows:

$$(2) \quad Outcome_{ijt} = \alpha_0 + \alpha_1 Mobile_i + \alpha_2 Treat_i + \alpha_3 Mobile_i \times Treat_i + \alpha_4 Post_t + \alpha_5 Treat_i \times Post_t + \alpha_6 Mobile_i \times Post_t + \beta_1 Mobile_i \times Treat_i \times Post_t + X_{ijt}\delta + \mu_i + \epsilon_{ijt}$$

where $Treat_i$ is a dummy indicating mothers who participated in the PESP program in 2015 and 2018, and equals zero for mothers who did not participate in the PESP program in both 2015 and 2018. Coefficient β_1 measures the relative changes in the gaps between program participating mothers who had a personal cellphone in 2018 and those who did not, and compares this to the gaps between non-program participating mothers. One of the benefits of the triple differences estimator is that it can reduce bias related to the intervention effect, especially when the outcome variables are determined by policy, time, and other variables (Berck and Villas-Boas, 2016). The key assumption of triple differences estimation is the same as the classical differences-in-differences estimation: namely, parallel trends assumption. Specifically, Olden and Moen (2022) assert that for causal interpretation, the triple differences estimator also requires only one parallel trend assumption to hold.

DATA

This study uses the panel dataset from the Bangladesh Integrated Household Survey (BIHS) in 2011, 2015, and 2018. BIHS is a comprehensive nationwide household survey designed by the Bangladesh Policy Research and Strategy Support Program (PRSSP), funded by USAID, and implemented by the International Food Policy Research Institute (IFPRI). For the main analysis, the sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2015 and 2018. This study uses various outcome measures to assess the impacts of the MFS on women's economic empowerment and its mechanisms: financial inclusion and control over income. In terms of the financial inclusion outcome, this study uses data on the savings and loans of individuals and households. To assess mother's degree of control over income, data on household education expenses and private expenses are used: a household's total education expenses in the last month, women- and men-reported private teaching, textbooks, stationery expenses for children in the last month, and total household expenses on cosmetics items. As discussed in Section III, an increase in women's control over income is expected to be reflected in the household's resource allocation: an increase in consumption for women's preferred items such as child education and women's private expenses such as cosmetics. In particular, this study closely examines detailed educational expenses as the stipend is earmarked for child education; program participating mothers had mainly used the stipend for private teaching and buying textbooks and stationery (DPE, 2013). Another important outcome measure is women's perceived decision-making power, as measured by 10-point Likert scale responses to the question: *"How would you rate your satisfaction with your power to make important decisions that change the course of your life?"* The key independent variables are time and personal cellphone ownership. Time indicates year 2018 and personal cellphone ownership is a dummy indicating

the individual had a cellphone in 2018.

This study controls for the number of cellphones owned by other family members and household MFS usage, as these can affect the observability of the stipend and women’s income control. The number of cellphones owned by other family members is calculated by subtracting the mother’s cellphone from the total number of cellphones in a household and reflects the possibility of other family members having access to the stipend. Household MFS usage data measures whether a household uses a cellphone for cash transfer. This study also controls for individual and household level characteristics that may affect the outcome measures: specifically, age, literacy, level of education, working status dummy, total household grant in the last year, household income per member in the last month, total household consumption in the last month, number of family members, number of adult members, number of children aged 6-10, female headed household dummy, and the number of negative events since 2011. All income and consumption measures are log transformed to conform normality. A more detailed description of the data is presented in Table 2-1.

TABLE 2-1
VARIABLES

Type	Category	Description
Dependent Variable	Financial Inclusion	Individual total savings (log), household total savings (log)
		Individual total loan (log), household total loan (log)
	Income Control: Consumption Outcomes	Education expenses last month (household total, log)
		Private teaching expenses for children last month (female/male, log)
		Textbook/stationery expenses last month (female/male, log)
		Private expenses: cosmetics (household total, log)
	Empowerment	Perceived decision-making power: <i>“How would you rate your</i>

		<i>satisfaction with your power to make important decisions that change the course of your life?"</i> (10-point Likert scale)
Key Independent Variable	Intervention Effect	Time (0: Year 2011, 2015, 1: Year 2018)
		Personal cellphone ownership (0: No personal cellphone in 2018; 1: Had a personal cellphone in 2018)
Controls	Individual level	Age
		Literacy (1: cannot read and write, 2: can sign only, 3: can read only, 4: can read and write)
		Level of education (0: never, 1: preschool, 2: reading, 3: class 1, 4: class 2, 5: class 3, 6: class 4, 7: class 5, 8: class 6, 9: class 7, 10: class 8, 11: class 9, 12: secondary, 13: higher secondary, 14: B.A., 15: M.A.)
		Working status (0: not working, 1: looking for a job, unpaid work, paid work)
	Household level	Number of cellphones owned by other household members
		Household MFS usage (any household member uses cellphone for cash transfer)
		Total household grant in the last year (log)
		Household income per member in the last month (log)
		Total household consumption in the last month (log)
		Number of family members
		Number of adult members (other than children aged 6-10)
		Number of children aged 6-10 (primary school age)
		Female headed household (0: Male headed, 1: Female headed)
		Number of negative events in household since 2011

Table 2-2 reports descriptive statistics for the sample in 2015 and 2018 and Table 2-3 reports the means and gaps in the variables by group and year; the mobile group indicates mothers who had a personal cellphone in 2018 and the no-mobile group indicates mothers without a personal cellphone in 2018. There are 129 individuals in the mobile group and 113 in the no-mobile group. In columns 2 and 3, the p-values from the t-test are reported in brackets. The simple mean

comparison results give an insight into the differences in the two groups before and after the intervention. Before the intervention, there were no significant differences in outcome variables between the two groups (Columns 1 and 2 in Panel A), but the gaps in the mean total household loan and mother’s perceived power to make important decisions became significantly different in 2018. Furthermore, the gaps in women’s expenses on private teaching, textbooks, stationery, and cosmetics increased, and the sign changed; the means are higher for mothers in the mobile group than mothers in the no-mobile group, although the differences are not statistically significant. Panel B and C indicates that some of the baseline characteristics were different between the two groups, and these variables are controlled for in the analyses.

TABLE 2-2
DESCRIPTIVE STATISTICS

	Obs.	Mean	Std.	Min.	Max.
<i>Panel A. Outcome variables</i>					
Household total savings (log)	486	6.31	4.38	0	13.71
Mother’s savings (individual, log)	486	4.47	4.25	0	12.47
Household total loan (log)	486	8.13	4.43	0	13.68
Mother’s loan (individual, log)	486	5.44	5.13	0	13.35
Education expenses in the last month (household, log)	486	5.31	0.65	0	7.52
Private teaching expenses in the last month (female, log)	484	8.09	1.19	3.93	10.84
Private teaching expenses in the last month (male, log)	486	3.63	3.92	0	9.8
Textbook/stationery expenses in the last month (female, log)	486	3.13	3.85	0	10.09
Textbook/stationery expenses in the last month (female, log)	486	4.97	2.96	0	9.62
Cosmetic expenses in the last month (household, log)	486	4.26	3.14	0	9.21
Perceived power to make important decisions	462	6.56	2.29	1	10

Panel B. Individual characteristics

Age	486	33.26	5.78	18	52
Education level	486	5.17	3.97	0	14
Literacy	486	3.2	1.1	1	4
Working status	486	0.87	0.33	0	1
Cellphone ownership (individual)	486	0.45	0.5	0	1

Panel C. Household characteristics

Number of cellphones owned by other family members	486	0.86	0.61	0	3
Mobile financial services usage	486	0.33	0.47	0	1
Household income per household member (log)	486	6.72	1.85	0	9.77
Household head's ethnicity	486	1	0	1	1
Female headed household	486	0.18	0.39	0	1
Beneficiary of the stipend program for disabled students	486	0.36	0.48	0	1
Total amount of grant in the last month (log)	486	7.04	1.62	0	11.04
Total consumption in the last month (household, log)	486	10.41	0.83	8.16	13.75
Number of negative events since 2011	486	1.12	0.42	1	4
Number of children (aged 6 to 10)	486	1.34	0.51	1	3
Number of household members	486	5.23	1.5	2	12
Number of adult members	486	3.9	1.47	1	11

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2015 and 2018.

TABLE 2-3
VARIABLE MEANS

	2015		2018
	No-mobile Mean	Mobile–No-mobile	Mobile–No-mobile
<i>Panel A. Outcome variables</i>			
Household total saving (log)	5.93	-0.18 [0.74]	0.18 [0.75]
Mother's savings (individual, log)	4.18	-0.49 [0.36]	0.79 [0.16]
Household total loan (log)	7.70	0.07 [0.91]	-0.98* [0.08]
Mother's loan (individual, log)	4.58	0.47 [0.47]	0.80 [0.23]

Education expenses in the last month (household, log)	7.55	0.09 [0.56]	0.10 [0.44]
Private teaching expenses in the last month (female, log)	3.16	-0.35 [0.46]	0.30 [0.56]
Private teaching expenses in the last month (male, log)	2.08	0.48 [0.29]	0.15 [0.77]
Textbook/stationery expenses in the last month (female, log)	4.86	-0.45 [0.22]	0.37 [0.34]
Textbook/stationery expenses in the last month (female, log)	3.73	0.00 [0.99]	0.12 [0.77]
Cosmetic expenses in the last month (household, log)	5.10	-0.06 [0.48]	0.06 [0.39]
Perceived power to make important decisions	6.27	-0.24 [0.44]	0.54* [0.06]

Panel B. Individual characteristics

Age	31.47	0.36 [0.62]	0.35 [0.63]
Education level	4.38	1.48*** [0.00]	1.54*** [0.00]
Literacy	3.04	0.31** [0.03]	0.34** [0.02]
Work	0.83	0.05 [0.25]	0.04 [0.33]

Panel C. Household characteristics

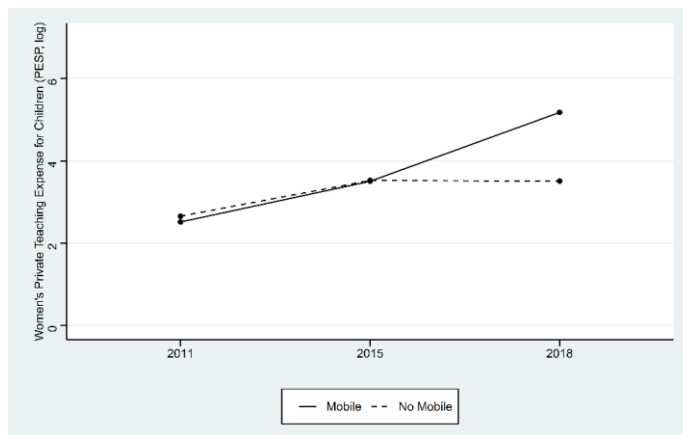
Number of cellphones owned by other family members	0.81	-0.05 [0.55]	-0.43*** [0.00]
Mobile financial services usage	0.02	0.08*** [0.01]	0.20*** [0.00]
Household income per household member (log)	6.88	-0.41* [0.07]	-0.71*** [0.01]
Female headed household	0.04	0.22*** [0.00]	0.31*** [0.00]
Beneficiary of the stipend program for disabled students	0.20	0.01 [0.91]	-0.04 [0.58]
Total amount of grant in the last month (household, log)	7.02	-0.05 [0.78]	-0.09 [0.70]
Total consumption in the last month (household, log)	10.14	0.12 [0.28]	0.16 [0.10]
Number of negative events since 2011	1.03	0.03 [0.33]	-0.06 [0.39]
Number of children (aged 6 to 10)	1.43	-0.05 [0.43]	0.02 [0.71]
Number of household members	5.47	-0.51*** [0.01]	-0.88*** [0.00]
Number of adult members	4.04	-0.45*** [0.01]	-0.90*** [0.00]

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2015 and 2018. Mobile group indicates mothers who had their own cellphone in 2018 and the no-mobile group indicates mothers without their own cellphone in 2018. There were 113 individuals in the no-mobile group, and 129 in the mobile group. The p-values from the t-test are reported in brackets.

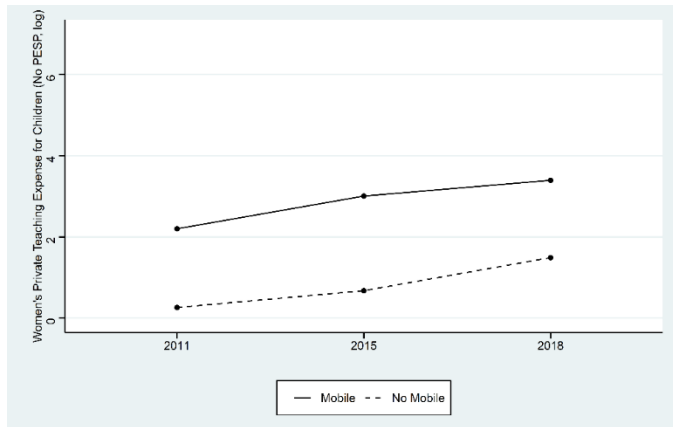
RESULTS

A. GRAPHICAL EVIDENCE

Figures 2-4 and 2-5 display the trends in selected outcome variables by personal cellphone ownership and PESP program participation. Figure 2-4 plots women’s private teaching expenses for children and Figure 2-5 depicts women’s perceived decision-making power between 2011 and 2018: Figure 2-5(a) depicts the trends of mothers who participated in the PESP program and Figure 2-5(b) depicts the trends of mothers who did not. Both figures show the expenses on a log scale. In the figures, solid lines indicate the trends in the mobile group and dash lines indicate the trends in the no-mobile group. The gaps between the mobile group and no-mobile group among PESP program participating mothers exhibit different patterns to the gaps of mothers who did not participate in the PESP program. Specifically, the gaps between mobile and no-mobile group diverges in 2018 for PESP program participating mothers; while the gap between the two groups remain similar for mothers who did not participate in the program and display parallel trends. This visual evidence supports the assumption that without the change in the payment scheme of the program, there would be no systematic difference in the gaps between mobile and no-mobile groups among PESP program participating mothers.



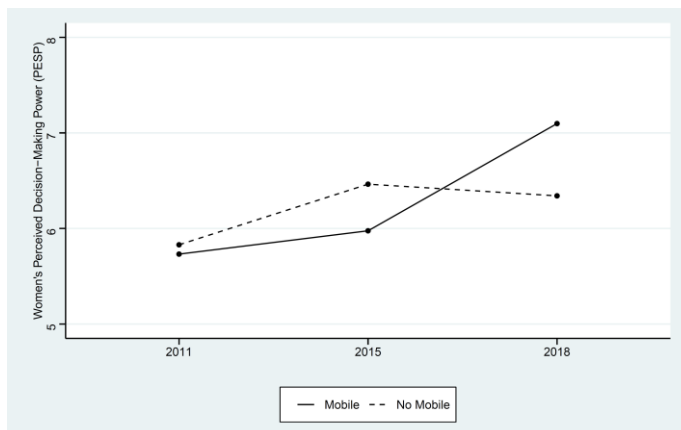
(a) Mothers Participating in the PESP Program



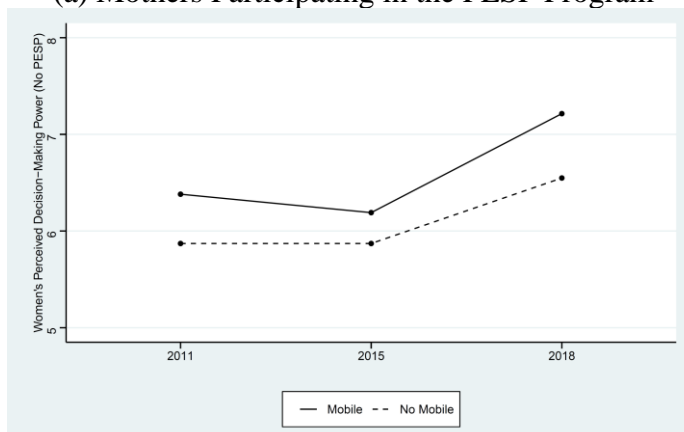
(b) Mothers Not Participating in the PESP Program
 FIGURE 2-4

Changes in Means of Women's Private Teaching Expenses for Children by Cellphone Ownership

Sources. Bangladesh Integrated Household Survey (2011, 2015, 2018)



(a) Mothers Participating in the PESP Program



(b) Mothers Not Participating in the PESP Program

FIGURE 2-5

Changes in Means of Women's Perceived Power to Make Important Decisions by Cellphone Ownership

Sources. Bangladesh Integrated Household Survey (2011, 2015, 2018)

A. REGRESSION ESTIMATION RESULTS

Main Results

This section presents regression analyses conducted to estimate the effects of the MFS on women's economic empowerment. Assuming that without the government's stipend payment scheme change in 2017 there would be no systematic differences in trends in the degree of economic empowerment between the mobile group and no-mobile group, post-2017 changes are interpreted as the effect of the mobile cash transfer. As discussed in Section V, this study estimates two models; equation (1) to estimate the differential effect of the MFS by personal cellphone ownership among PESP participating mothers, and equation (2) to further test the results by estimating the relative changes in the gaps between mobile and no-mobile groups of PESP participating mothers, as compared with the gaps of non-participating mothers who might not have been affected by the change. Table 2-4 presents the estimation results using equation (1) where the dependent variables are financial inclusion measures. Panel A presents the results for program participating mothers, and panel B presents the results for non-participating mothers. The results in column 2 in Panel A reveal a marginally significant positive effect on savings for women in the mobile group. However, I cannot conclude that this effect is driven by the mobile cash transfer program as a similar effect was also found for non-participants (Panel B, column 2).

TABLE 2-4

EFFECT OF MOBILE CASH TRANSFER ON PROGRAM PARTICIPATING MOTHER'S FINANCIAL INCLUSION

	(1) Total Saving (log)	(2) Individual Saving (female, log)	(4) Total Loan (log)	(5) Individual Loan (female, log)
<i>Panel A. Program Participating Mothers</i>				
Mobile × Post	0.54 (0.67)	1.25* (0.73)	-0.84 (0.69)	0.34 (0.84)
Observations	484	484	484	484
Adjusted R ²	0.33	0.26	0.34	0.34
<i>Panel B. Non-Participating Mothers</i>				
Mobile × Post	0.58 (0.65)	1.22* (0.66)	-0.19 (0.65)	0.40 (0.72)
Observations	518	518	518	518
Adjusted R ²	0.39	0.40	0.44	0.43

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2015 and 2018 for Panel A, and mothers of children aged 6-10 who did not participate in the PESP program in both 2015 and 2018 for Panel B. Clustered standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members, total household grant (log), household income per member (log), total household consumption (log), number of family members, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Table 2-5 reports the effects of the mobile cash transfer on household resource allocation, specifically on child education and private expenses. The results in Panel A suggest that the mobile cash transfer increased the reported expenses on private teaching for children of the mobile group women by 113 percent (column 2) and expenses on textbook and stationery by 92 percent (column 5) relative to the no-mobile group, while there were no statistically significant effects on men-reported educational expenses (column 3, 5) and total household educational

expenses (column 1). In addition, the mobile cash transfer increased the mobile group women’s expenses on cosmetics – which is a private cost for women – although the coefficient is marginally significant. By contrast, Panel B reports that effects of the MFS were different for non-program participating women: the mobile groups’ total household education expenses decreased relative to that of the no-mobile group.

TABLE 2-5

EFFECT OF MOBILE CASH TRANSFER ON EDUCATION AND PRIVATE EXPENSES OF PROGRAM PARTICIPATING HOUSEHOLDS

	(1) Total Education Expenses (log)	(2) Personal Teaching Expenses (female, log)	(3) Personal Teaching Expenses (male, log)	(4) Textbook/ Stationery Expenses (female, log)	(5) Textbook/ Stationery Expenses (male, log)	(6) Private Expenses- Cosmetics (log)
<i>Panel A. Program Participating Mothers</i>						
Mobile × Post	0.11 (0.16)	1.13** (0.56)	-0.35 (0.51)	0.92** (0.38)	-0.06 (0.39)	0.18* (0.09)
Observations	480	484	484	484	484	484
Adjusted R^2	0.51	0.38	0.44	0.58	0.60	0.43
<i>Panel B. Non-Participating Mothers</i>						
Mobile × Post	-0.61* (0.36)	-0.54 (0.56)	-1.24** (0.53)	-0.74* (0.43)	-0.47 (0.47)	0.00 (0.09)
Observations	512	518	518	518	518	516
Adjusted R^2	0.30	0.38	0.41	0.53	0.50	0.44

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2015 and 2018 for Panel A, and mothers of children aged 6-10 who did not participate in the PESP program in both 2015 and 2018 for Panel B. Clustered standard errors in parentheses. Age, education, literacy, working status, total household grant (log), household income per member (log), total household consumption (log), number of children aged 6-10, number of adults, female headed household dummy, number of negative events since 2011, number of cellphones owned by other household members, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Next, this study assessed the effect of mobile cash transfer on women’s empowerment as measured by individuals’ satisfaction with their power to make important decisions. Because the dependent variable is measured on a Likert-scale, the model is estimated using Ordered Probit estimation methods. The results in Panel A of Table 2-6 suggest that the mobile cash transfer program significantly raised perceived decision-making power for mothers in the mobile group relative to mothers in the no mobile-group. For ease of interpretation, the coefficient is also estimated using the OLS estimation method, which is equivalent to 1.23 at the 5 percent significance level. By contrast, Panel B results reveal no significant changes in perceived decision-making power for non-participating mothers in the mobile group.

TABLE 2-6

EFFECT OF MOBILE CASH TRANSFER ON PROGRAM PARTICIPATING WOMEN’S PERCEIVED DECISION-MAKING POWER

	Perceived Decision-Making Power
<i>Panel A. Program Participating Mothers</i>	
Mobile × Post	0.80*** (0.22)
Observations	460
Model	Ordered Probit
<i>Panel B. Non-Participating Mothers</i>	
Mobile × Post	0.12 (0.21)
Observations	476
Model	Ordered Probit

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2015 and 2018 for Panel A, and mothers of children aged 6-10 who did not participate in the PESP program in both 2015 and 2018 for Panel B. Robust standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members, total household

grant (log), household income per member (log), total household consumption (log), number of family members, female headed household dummy, number of negative events since 2011, household MFS usage controlled. The coefficient estimated by OLS estimation method is 1.23 (at the 5 percent significance level) for Panel A. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Differences-in-differences-in-differences Estimation Results

One of the key assumptions of the differences-in-differences estimation is that treatment assignment is exogenous to the outcome variable. In this study, PESP program assignment and mothers' cellphone ownership determines the intervention effects; however, the program assignment and cellphone ownership were not random, thus potential endogeneity may exist due to selection bias. As a robustness check, this study also estimates differences-in-differences-in-differences (DDD) model as specified in equation (2), using differences in time, PESP program assignments, and mothers' personal cellphone ownership. The triple-differences estimator can reduce bias related to the intervention effect (Berck and Villas-Boas, 2016), and requires only one parallel trend assumption to hold for causal interpretation (Olden and Moen, 2022). In this analysis, the sample is restricted to mothers of children aged 6-10 who did and did not participate in the PESP program in both 2015 and 2018, respectively. Triple-differences estimates measure the relative changes in the gap between the mobile and no-mobile group of PESP participating mothers compared with the gap for non-PESP participating mothers. Table 2-7 presents the effects of the government's mobile cash transfer on the financial inclusion of PESP participating mothers in the mobile group. As discussed in the main findings (Table 2-4), there were no statistically significant differential effects on the financial inclusion of PESP participating mothers with a personal cellphone.

TABLE 2-7

EFFECT OF MOBILE CASH TRANSFER ON PROGRAM PARTICIPATING MOTHER'S FINANCIAL INCLUSION: DDD

	(1)	(2)	(4)	(5)
	Total Saving (log)	Individual Saving (female, log)	Total Loan (log)	Individual Loan (female, log)
Mobile × Treat × Post	-0.08 (0.92)	-0.06 (0.93)	-0.48 (0.90)	-0.24 (1.03)
Observations	1,002	1,002	1,002	1,002
Adjusted R^2	0.36	0.34	0.39	0.39

Note. Sample is restricted to mothers of children aged 6-10 who did and did not participate in the PESP program in both 2015 and 2018. Clustered standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members, total household grant (log), household income per member (log), total household consumption (log), number of family members, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Next, Table 2-8 presents the results of the regression on household consumption. This reveals positive differential effects of the mobile cash transfer on total household expenses on child education and women's expenses on textbook and stationery for PESP participating mothers who had a personal cell phone, but the coefficients on women's expenses for private teaching (column 2) and cosmetics (column 6) are no longer statistically significant.

TABLE 2-8

EFFECT OF MOBILE CASH TRANSFER ON EDUCATION AND PRIVATE EXPENSES OF PROGRAM PARTICIPATING HOUSEHOLDS: DDD

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Education Expenses (log)	Personal Teaching Expenses (female, log)	Personal Teaching Expenses (male, log)	Textbook/ Stationery Expenses (female, log)	Textbook/ Stationery Expenses (male, log)	Private Expense- Cosmetics (log)
Mobile× Treat × Post	0.59* (0.35)	1.25 (0.77)	0.76 (0.72)	1.30** (0.55)	0.72 (0.55)	0.17 (0.13)
Observations	992	1,002	1,002	1,002	1,002	1,000
Adjusted R^2	0.35	0.38	0.43	0.55	0.54	0.43

Note. Sample is restricted to mothers of children aged 6-10 who did and did not participate in the PESP program in both 2015 and 2018. Clustered standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members, total household grant (log), household income per member (log), total household consumption other than education expenses (log), number of children aged 6-10, number of adults, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Table 2-9 reports the effects of the MFS on women's perceived decision-making power and life satisfaction. Compared with non-PESP participating mothers, there was a larger increase in the gap between the mobile group and no-mobile group in relative satisfaction with decision-making power among PESP participating mothers.

TABLE 2-9

EFFECT OF MOBILE CASH TRANSFER ON PROGRAM PARTICIPATING WOMEN'S
PERCEIVED DECISION-MAKING POWER: DDD

	Perceived Decision-making Power
Mobile × Treat × Post	0.49* (0.29)
Observations	936
Model	Ordered Probit

Note. Sample is restricted to mothers of children aged 6-10 who did and did not participate in the PESP program in both 2015 and 2018. Robust standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members, total household grant (log), household income per member (log), total household consumption (log), number of family members, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Falsification Test

As an additional specification check, this study conducted the analyses using the sample of mothers who participated in the PESP program in both 2011 and 2015, prior to the intervention period. In this test, 2011 is the baseline year and 2015 is the post period. If significant differences are observed in trends between the mobile and no-mobile group before the intervention, the parallel trend assumption will not hold. However, there are no significant effects of the MFS on all outcome variables (Table 2-10, 2-11, 2-12).

TABLE 2-10

EFFECT OF CELLPHONES ON PROGRAM PARTICIPATING MOTHER'S FINANCIAL INCLUSION: BEFORE INTERVENTION

	(1) Total Saving (log)	(2) Mother Saving (log)	(4) Total Loan (log)	(5) Mother Loan (log)
Mobile × Post	0.02 (0.91)	-0.98 (0.84)	0.53 (0.97)	-0.98 (1.01)
Observations	586	586	586	586
Adjusted R^2	0.39	0.41	0.42	0.40

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2011 and 2015. Clustered standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members in, total household grant (log), household income per member (log), total household consumption (log), number of family members, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

TABLE 2-11

EFFECT OF CELLPHONES ON EDUCATION AND PRIVATE EXPENSES OF PROGRAM PARTICIPATING HOUSEHOLD: BEFORE INTERVENTION

	(1) Total Education Expenses (log)	(2) Personal Teaching Expenses (female, log)	(3) Personal Teaching Expenses (male, log)	(4) Textbook/ Stationery Expenses (female, log)	(5) Textbook/ Stationery Expenses (male, log)	(6) Private Expenses- Cosmetic (log)
Mobile × Post	0.08 (0.19)	1.09 (0.90)	-0.80 (0.66)	0.32 (0.47)	-0.26 (0.53)	-0.14 (0.16)
Observations	586	586	586	586	586	580
Adjusted R^2	0.63	0.31	0.53	0.55	0.62	0.22

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2011 and 2015. Clustered standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members, total household grant (log), household income per member (log), total household consumption other than education expenses (log), number of children aged 6-10, number of adults, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

TABLE 2-12

EFFECT OF CELLPHONES ON PROGRAM PARTICIPATING WOMEN'S PERCEIVED
DECISION-MAKING POWER: BEFORE INTERVENTION

	Perceived Decision- Making Power
Mobile × Post	0.24 (0.29)
Observations	580
Model	Ordered Probit

Note. Sample is restricted to mothers of children aged 6-10 who participated in the PESP program in both 2011 and 2015. Robust standard errors in parentheses. Age, education, literacy, working status, number of cell phones owned by other household members in, total household grant (log), household income per member (log), total household consumption (log), number of family members, female headed household dummy, number of negative events since 2011, household MFS usage controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

CONCLUSION

The government's adoption of a mobile payment scheme in the stipend program can reduce inefficiencies and administrative cost of the program from the supply side, but its effect on the demand side is uncertain, especially for women beneficiaries. By examining women participants in the Primary Education Stipend Program (PESP) in Bangladesh, this study identified differential effects of mobile cash transfer on women in rural areas depending on personal cellphone ownership. Specifically, the adoption of a mobile payment scheme in the stipend program increased child education expenses and perceived decision-making power 113 percent more for program participating mothers with a personal cellphone compared with mothers without a personal cellphone. The limitation of this study is a potential endogeneity due to the selection bias which challenges a causal interpretation. To address this concern, this study

conducted several falsification tests and visual analyses of non-program participating mothers and pre-intervention period samples, and the results support the validity of the specification.

By examining the effects of mobile stipend payments on women with varying access to their mobile accounts, this study highlights the potential exclusionary effects of mobile financial services on women who have limited digital access. In recent years, mobile money and mobile cash transfer programs have expanded rapidly in the developing world, leveraging the high penetration of mobile subscriptions, and studies reveal that it has positive impacts on empowerment among women “users”. Moreover, this study provides empirical evidence that suggests reducing gender gaps in digital access and digital literacy is important in providing the MFS for all.

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CHAPTER 3

WOMEN'S CONTROL OVER MICROCREDIT AND INTRAHOUSEHOLD RESOURCE ALLOCATION: EVIDENCE FROM BANGLADESH

INTRODUCTION

Success stories concerning microcredit programs in Bangladesh have inspired a large number of developing countries and led to a proliferation of microcredit programs over the last three decades. These programs, which provide small loans to people who have limited access to formal financial services, are usually directed at women. Moreover, women entrepreneurs have played a key role in many of the success stories; with access to credit, women entrepreneurs make better investment decisions, intrahousehold bargaining power increases, and they use the increased returns for loan repayment and their family, thereby creating a virtuous cycle. In fact, a substantial number of studies suggest that women's economic empowerment improves household welfare and development outcomes as women invest more for their family in areas such as child education and health (Aker et al., 2016; see also Duflo, 2012).

However, empirical evidence on the effects of microcredit programs on household welfare is thin and unclear, especially for social outcomes such as child education, health, and women's empowerment (Banerjee et al., 2015a; Banerjee et al., 2015b). What is the missing element in the virtuous cycle of the microcredit program? Large studies have assessed the impact of women's

access to loans on development outcomes, but qualitative studies have questioned the linkage between women's access to loans and actual control over microcredit loans. These studies provide anecdotal evidence that loans directed to women do not guarantee control over their loan and empowerment (White, 1991; Goetz and Gupta, 1996; Mayoux, 2000). Specifically, Goetz and Gupta (1996) found that women's loans are commonly invested in male family member's business and 39 percent of women surveyed answered that they have very limited or no control over their loans. With such restricted control over loans, the microcredit program is merely an additional source of loans for a household; therefore, gender-oriented social outcomes achieved by targeting women could be limited.

To address these gaps in knowledge, this study empirically investigates how women's control over their loans is related to intrahousehold resource allocation: defined as investment in productive household activities and consumption. Using 3 waves of the individual panel survey dataset, this study finds that conventional gendered patterns exist in the relationship between women's control over loan use and a household's loan investment; women's decision over loan use is negatively related to the loan investment in men-dominated activities, such as non-farm businesses, but positively related to loans used for women-related activities, such as loan repayment. This implies that women's control over loan and investment choices can be limited by the gendered nature of investment activities. However, this study also finds a positive linkage between women's control over loan use and their inputs into decisions made about a household's overall economic activities, including men-dominated activities. In terms of household consumption, women's access to loans is positively related to their monthly education expenses, conditional on women's decisions over loan use. All things being equal, women who have control over loan use are expected to have 254 percent higher monthly education expenses on average

than women who do not have control over loan use.

Taken together, women's control over loan use or the bargaining power over loans is restricted to household consumption, but remains positively related to the social impacts of microcredit programs: namely, women's active participation in economic activities and greater investment in children's education. This finding partly explains the unclear or mixed effects of microcredit programs on social outcomes in previous studies; heterogeneity in the degree of control over loans among women borrowers is an important characteristic to consider when evaluating the impact of microcredit programs. The results also imply that we should pay more attention not only to credit outreach to women but also program design to empower women to actively participate in a household's economic activities and productive investment.

This study contributes to the broader literature on microfinance, financial inclusion, and women empowerment. A substantial number of studies report the effects of women's access to microcredit on households and women (Banerjee et al., 2015a; Banerjee et al., 2015b; Alam, 2012), but these are mixed and sometimes unsatisfactory. This study strives to understand the mixed evidence by examining the intrahousehold bargaining process over financial decisions: who controls a woman's loan? Several qualitative studies provide anecdotal evidence of the limited degree of women's control over loans (Goetz and Gupta, 1996; Rozario, 2002), but the relationship between women's control over loans and social outcomes at household-level has not been empirically tested. This study also adds to evidence for women's economic empowerment and intrahousehold resource allocation (Anderson and Baland, 2002; Duflo, 2003; Schaner, 2011).

The remainder of this paper is organized as follows. Section II presents a brief history of microcredit in Bangladesh. Section III summarizes relevant literature. Section IV describes the conceptual framework. Section V discusses the identification strategy and section VI describes the data. Section VII discusses the results and Section VIII provides concluding comments.

MICROCREDIT IN BANGLADESH

The burgeoning of microcredit programs began with the establishment of the Grameen Bank in Bangladesh in 1976 by Muhammad Yunus, a Nobel Peace Prize laureate. The aim was to provide credit to marginalized populations who do not have any access to financial services. Since independence in 1971, the Bangladeshi government's financial services through national co-operative banks and agricultural banks rarely reached their target as they demand collateral (White, 1991). Moreover, other types of loans outside of formal institutions, for example, borrowing from money lenders or between patron-client relationships, were usually more expensive than formal financial services. Against this backdrop, the Grameen Bank's innovative group lending system was a huge success. It allowed poor people, specifically women, to borrow money without any collateral by forming a small informal "solidarity group" in which each member guarantees repayment and supports self-reliance among their fellow members. In addition, the Grameen Bank secured higher repayment rates than other commercial banks (White, 1991; Yunus, 2009).

Following the success stories of the Grameen Bank, the Bangladeshi government tried to channel several credit services through national non-governmental organizations (NGOs), which led to an expansion of microcredit programs and credit becoming an essential component of NGO programs (White, 1991). Although NGOs have caused microcredit programs to flourish, the

welfare effect on the poor was called into question during the transition period, as some institutions imposed high interest rates of up to 30 to 40 percent (MRA, 2019). For these reasons, the Bangladeshi government established the Microcredit Regulatory Authority (MRA) in 2006 to monitor the microfinance institutions (MFIs). According to the 2019 report by the MRA, 842 MFIs cover more than 32 million members, disburse more than 7.2 billion USD annually, and 92 percent of total borrowers are women (Figure 3-1).

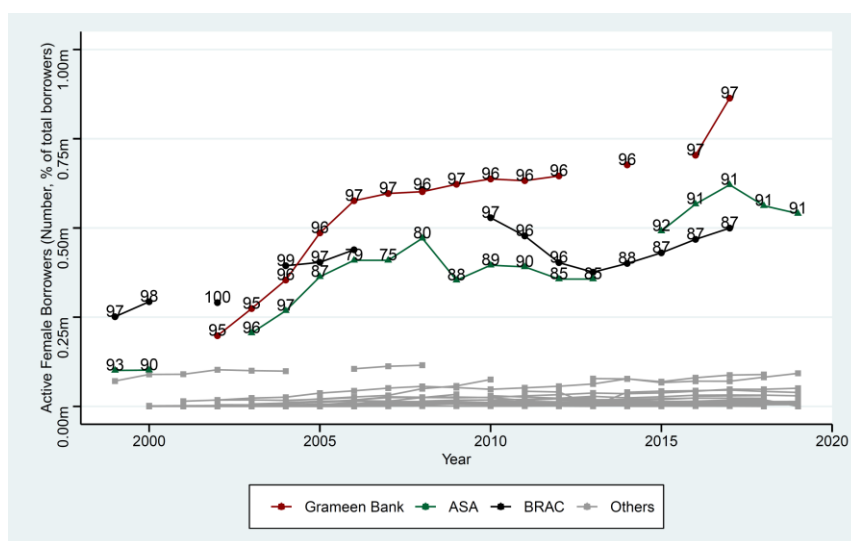


FIGURE 3-1

Ratio of Active Female Borrowers to Total Borrowers
Source. MIX Market (World Bank)

LITERATURE REVIEW

With microcredit programs expanding since the mid-1990s, debates over the impact of microcredit on household economy and social development have continued for more than 20 years. A substantial number of studies suggest that microcredit has positive, or at least modest, impacts on household income and consumption (Pitt and Khandker, 1998; Khandker, 2005; Armendariz and Morduch, 2010; Roodman, 2011; Breza and Kinnan, 2017). However, others

have reported negligible or negative impacts of microcredit on the household economy and society (Bateman and Chang, 2012; Hulme and Maitrot, 2014). More recently, studies have highlighted the heterogeneous effects across clients by gender, region, poverty level, year of credit membership, and so on (Banerjee et al., 2015a; Banerjee et al., 2015b; Islam, 2014; Gull and Morduch, 2017; Ara et al., 2020). For instance, Banerjee et al. (2015a, 2015b) presented evidence of business growth, but also suggest that effects may differ between households who were already running a business before having access to microcredits and those who were not (Banerjee et al., 2015a).

In terms of the impact of microcredit on social outcomes, such as child education, health, and women's empowerment, the evidence is rather mixed and unclear (Rozario, 2002; Banerjee et al., 2015a; Banerjee et al., 2015b; Alam, 2012; Lakdawala, 2018). For example, Alam (2012) found that women borrower's self-employment returns (assuming that the loan is invested in "her own" enterprise,) increases investment in child education and health, as well as empowering women in rural Bangladesh. However, six randomized evaluation studies introduced by Banerjee et al. (2015b) found limited effects on child education and female empowerment; a study in Bosnia revealed a significant decline in school attendance among 16–19-year-olds (similar evidence was found in Lakdawala, 2018), a study in Mexico reported a small but significant increase in female decision-making power, but other studies reported no significant effects.

Specifically, a number of studies provide anecdotal evidence as to why women's access to credit does not necessarily lead to women's empowerment (White, 1991; Goetz and Gupta, 1996; Mayoux, 2000; Rozario, 2002). For example, White (1991) strived to identify the main user of the loan by examining the activities for which the loan is used and concluded that 50 percent of

loans taken by women are for male-dominated activities (e.g., cultivation, leasing land, business). Following the unitary model of the household, it seems natural for households to invest in male-dominated activities as these are generally more productive. However, White (1991) points out a more fundamental problem in that the gendered division of labor limits higher productivity opportunities for women. Advancing this a step further, Goetz and Gupta (1996) captured women's control over loans in various forms; for example, women's participation in loan invested male-dominated activities through managerial and contractual arrangements. By developing an index of loan control using information on women's control over the productive process, including managerial controls and labor contributions, they found that 28.7 percent of women have very limited or no control over loans, 24.1 percent have partial controls, and 37.2 percent have significant or full control (Goetz and Gupta, 1996). Furthermore, Rozario (2002) argues that women's access to credit increases dowry, hampers women's solidarity in the community while competing over loans, and causes over indebtedness of households.

In fact, a substantial number of studies have shown that women's control over income and economic empowerment has greater development benefits such as higher spending on nutritious food, health, and child education (Thomas, 1990; Duflo 2003). Duflo (2012) asserts that intrahousehold resource allocation and consumption patterns can be gender-biased depending on each member's earnings, bargaining power, and information sets. For example, Duflo and Udry (2004) revealed that increased income from women's agriculture production leads to an increase in education and food expenditure, but not for private goods such as alcohol and tobacco. In this context, many microcredit programs target women as clients as they expect that women's access to loans will improve their intrahousehold bargaining power, thus leading to higher investment in children and family.

In short, women’s economic empowerment is not only an important goal of microcredit programs but also a critical channel for achieving social impacts. Following up on previous anecdotal evidence, this study strives to understand the mixed evidence of microcredit programs, especially on social impacts, by focusing on women’s control over loans and intrahousehold gender dynamics. While previous studies rely on women’s input in productive activities and gendered characteristics of loan invested activities to estimate the degree of control women have over loans, this study benefits from a rich dataset that includes information on both “*who makes decision over loan use*” and “*what the loans are mainly used for*”. Using this dataset, this study tests the hypotheses of previous studies and investigates the nexus between access to loans, women’s control over loan use, and intrahousehold resource allocation. In so doing, this study contributes to the broader literature on microfinance, financial inclusion, women empowerment, and household resource allocation.

CONCEPTUAL FRAMEWORK

To explain the disconnect between women’s access to loans and the desired social impacts of microcredit programs, this study builds a structural model of intrahousehold bargaining process over loan use that follows the collective model of the household (Chiappori, 1988; Chiappori, 1992). In addition, it incorporates the ideas of Gu et al. (2021), who distinguish household financial decisions from consumption decisions. The framework is summarized in Figure 3-2.

In the first step of the bargaining process, family members decide on the household’s investment portfolio: how much to invest, and in what business to invest. In this process, each member’s preferences over risk are weighted according to their bargaining power, which is determined by individual characteristics as well as gender effects (Gu et al., 2021). Individual characteristics

include income, education, age. A woman's access to loans can therefore increase her intra-household bargaining power. Gender effects means that the gap is unexplained by individual differences. Gu et al.(2021) found that, in the average Australian household, the relative importance of the husband's risk preference is 44 percent higher than that of his wife, and this gender effect is closely related to an individual's gender norms. . If the gender effect is strong, women's increased bargaining power due to her access to loans will have a limited or negative impact on household investment decisions.

In the next step, for a loan invested in the household's business, the most responsible person for the business will take control over the loan and have a higher claim over the return. Another channel whereby a woman can raise her claim over the return from another member's business is having input into the decisions (not necessarily limited to financial decisions) made about the business. At the same time, the proportion of loan invested in the family business is expected to be high as the total amount of loan increases. In terms of using the leftover loan for consumption, this depends on each individual's preference and bargaining power as predicted by the canonical collective model of the household.

Following this framework, the first research question that this study strives to answer is whether, as suggested in previous studies, women's control over loan use is limited to less productive non-financial activities (White 1991, Goetz and Gupta, 1996). Secondly, this study investigates the linkage between women's access to loan and household consumption conditional on women's decision over loan use.

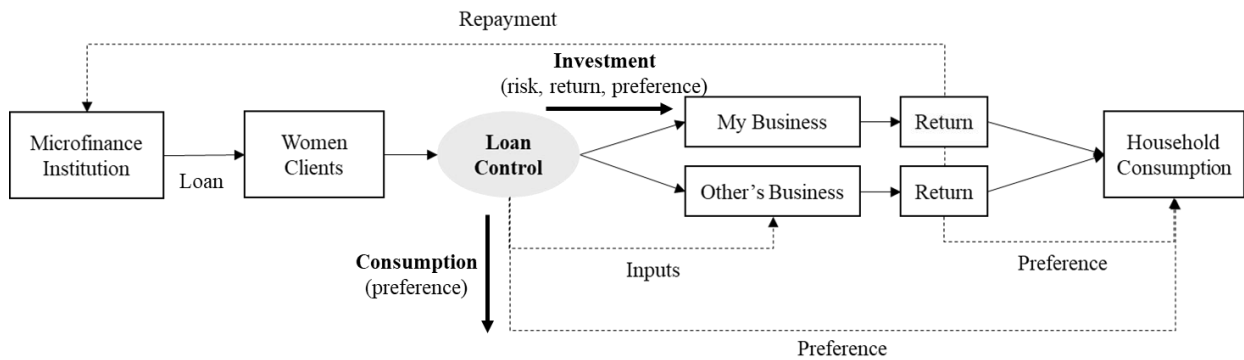


FIGURE 3-2

Conceptual Framework

IDENTIFICATION STRATEGY

To estimate the linkage between women’s access to loan, control over loan use, and household resource allocation, this study utilizes panel fixed effects estimation methods. The model is specified as follows:

$$Outcome_{ijt} = \beta_0 + \beta_1 Decision_{ijt} + \beta_2 Current\ loan_{ijt} + \beta_3 Decision_{ijt} \times Current\ loan_{ijt} + X_{ijt}\delta + \mu_i + \gamma_t + \epsilon_{ijt}$$

where i denotes individuals, j denotes households, t denotes the wave. The dependent variable $Outcome_{ijt}$ represents a household’s loan investment and consumption outcome.

In terms of a household’s loan investment outcome, 25 activities were classified into four binary variables indicating “*What was the loan mainly used for?*”: such as agricultural business, non-farm business, household expenses, and repaying other loans. The main purpose of this exercise is to determine whether there is any gendered pattern between women’s control over loan use and a household’s loan investment activities, which may imply the existence of social barriers that limits women’s choices. The selection of the four categories is based on previous literature,

which use investment activities to measure the degree of women's control over loans. Specifically, investment activities were highly gendered in Bangladesh in the 1990s; for example, activities such as poultry raising, sericulture, and dowry payments were considered as women's domain, while activities such as crop farming, construction, rickshaw, and marketing business (e.g., sell at the market, cash transaction) were considered as men's domain (White, 1991; Goetz and Gupta, 1996). However, the gendered pattern is less obvious for general consumption and financial costs (e.g., interest and old-debt repayment) (White, 1991; Goetz and Gupta, 1996). In contrast to previous literature, this study takes advantage of the rich availability of data that allows direct measurement of the degree of control over loans as well as what the loan is mainly used for. Consequently, it is possible to test whether women's control over loan use is actually related to gendered investment activities. With respect to the household's consumption outcome, this study uses the household's total education expenses, women reported- and men reported- education expenses, and health expenses in the last month. All consumption variables are log-transformed to conform to normality.

On the right side of the equation, $Decision_{ijt}$ indicates women's general power to control the loan borrowed from microfinance institutions. To measure this, answers to the question "*Who usually decides how to spend the money from the loan?*" were used, which are categorized as 1: yourself, 2: your husband, 3: self and husband, 4: someone else. This study recategorizes these answers into binary values; zero if an individual answered that the husband or someone else decides, one if they answered that they themselves decide. To reduce any bias caused by variations in the middle response category, this study excludes individuals who answered that they make decisions together with their husbands. This is because actual decision-making power could be substantially different among these women. $Current\ loan_{ijt}$ is the current amount of

loans an individual has borrowed from microfinance institutions. β_1 and β_3 measure the difference in the effects of microcredit loans between women who have control over loan use versus those who do not. Using 3 waves of the individual panel survey dataset, this model includes terms for individual fixed effects μ_i and wave fixed effects γ_t to control for any unobserved individual- and wave-specific effects. X_{ijt} denotes the following individual and household level control variables: level of education, literacy, age, age squared, marital status, total household income, total household savings, household non-food/food expenditures, number of children aged 6-10, number of family members other than children, female-headed household.

Finally, this study also examines the linkage between women's decisions over loan use and their participation in economic activities within households. The latter is measured by the degree of input women have in making decisions about various economic activities within households, namely, food crop farming, cash crop farming, livestock raising, and non-farm economic activities. Using 3 scale answers to the question "*How much input did you have in making decisions about...?*", the relationship is estimated by ordered logit estimation methods.

DATA

This study uses a representative panel survey dataset from the Bangladesh Integrated Household Survey (BIHS) in 2011, 2015, and 2018. BIHS is a comprehensive nationwide household survey designed by the Bangladesh Policy Research and Strategy Support Program (PRSSP), funded by USAID, and implemented by the International Food Policy Research Institute (IFPRI). The key variables discussed in Section V are summarized in Table 3-1.

TABLE 3-1
VARIABLES AND SOURCES

Type	Variables	Description
Dependent Variable	Investment Outcomes: <i>“Loan was mainly used for...”</i>	Agricultural activities: buy fertilizer, seeds, pesticides, irrigation equipment, other agricultural implements, buy water for irrigation, costs of diesel/electricity for agriculture, labor wages for agriculture, costs of hired machines/animals for agriculture, lease of land for agriculture (cash only), purchase land, purchase cows/goats
		Non-farm business: business enterprise, buy productive assets for purposes other than agriculture, lease of land used for purpose other than agriculture (cash only)
		Household expenditure: for medical treatment, to meet household consumption needs, educational expenses, marriage expenditure, dowry, funeral
		Loan repayment: to repay other loans
	Consumption Outcomes	Education expenses in the last month (household total/male/female, log)
		Food expenses in the last month (household total, log)
	Participation in Economic Activities	Answers to <i>“How much input did you have in making decisions about food crop farming/cash crop farming/livestock raising/non-farm business/wage and salary employment/fishing”</i> (1: No input/Input into very few decisions, 2: Input into some decisions, 3: Input into most decisions/Input into every decision)
Key Independent Variable	Women’s control over loan	Decision over loan use (previous or current loan from microfinance institutions): <i>“Who usually decides how to spend the money from the loan?”</i> (0: others, 1: myself)
		Current loan (log): individual’s total amount of loans currently borrowed from MFIs
Controls	Individual	Level of education (0: never, 1: preschool, 2: reading, 3: class 1, 4: class 2, 5: class 3, 6: class 4, 7: class 5, 8: class 6, 9: class 7, 10: class 8, 11: class 9, 12: secondary, 13: higher secondary, 14: B.A., 15: M.A.)
		Literacy (1: cannot read and write, 2: can sign only, 3: can read only, 4: can read and write)
		Age
		Marital status (0: once/never married, 1: currently married)
	Household	Female headed household (0: no, 1: yes)
		Number of children (aged 6-10)
		Number of household members (other than children)
		Household income in the last month (log)
		Household savings in the last month (log)
		Household non-food expenses in the last month (log)
Household food-expenses in the last month (log)		

For the analyses, the sample is first restricted to women aged above 18 who have borrowed loans from microfinance institutions (MFIs) in 2011, 2015, 2018. In addition, missing observations (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire (i.e., make decisions over loan use together with husband) are excluded from the analyses. Table 3-2 reports descriptive statistics for the sample used in the analyses and the means of the full sample.

TABLE 3-2
DESCRIPTIVE STATISTICS

	Obs.	Mean	Std.	Min.	Max.	Full-Sample Mean
Loan use: agricultural business	409	0.15	0.36	0	1	0.15
Loan use: non-farm business	409	0.15	0.36	0	1	0.15
Loan use: household expenses	409	0.23	0.42	0	1	0.18
Loan use: loan repayment	409	0.15	0.37	0	1	0.15
Input in making decision: Food crop	416	2.56	0.59	1	3	2.59
Input in making decision: Cash crop	252	2.48	0.58	1	3	2.56
Input in making decision: Livestock	344	2.74	0.49	1	3	2.73
Input in making decision: Non-farm business	110	2.44	0.63	1	3	2.61
Total education expenses (log)	409	5.83	3.92	0	11.41	5.97
Male education expenses (log)	409	3.56	4.06	0	11.41	3.86
Female education expenses (log)	409	3.94	4.08	0	10.37	3.72
Food expenses (log)	409	7.14	0.67	5.09	8.98	7.10
Loan use decision (0: Others, 1: Myself)	409	0.39	0.49	0	1	0.27
Current loan (log)	409	6.11	4.98	0	12.47	5.58
Age	409	41.95	10.87	18	75	37.17
Education	409	3.96	4.22	0	15	4.58
Literacy	409	2.76	1.19	1	4	2.96
Marital status (0: Once or never married, 1: Married)	409	0.66	0.48	0	1	0.94
Female headed household	409	0.42	0.49	0	1	0.14

Number of children	409	0.53	0.67	0	3	0.60
Number of adult (other than children)	409	3.80	1.77	1	12	3.86
Household income (log)	409	7.89	2.54	0	12.61	8.27
Household saving (log)	409	6.54	3.72	0	12.23	6.09
Household non-food expenses (log)	409	11.08	1.06	7.94	14.03	11.01
Household food-expenses (log)	409	7.14	0.67	5.09	8.98	7.10

Note. Sample is restricted to women aged above 18 who have borrowed loans from MFIs in 2011, 2015, 2018, excluding missing (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire. The number of full sample observations is 6,760. Scale of the full sample mean for the loan use decision variable is from 0 to 2.

The most noticeable differences between the full sample and the sample used in this study are marital status and the sex of the household head. In the current sample, the ratio of women who are currently married is 66 percent, which is much lower than the ratio in the full sample of 94 percent. Consequently, the ratio of female headed households in the current sample is 35 percentage points higher than the full sample. However, these differences are inevitable because many married women who make loan use decisions together with their husbands are excluded from the sample to reduce noises in the middle response. Figure 3-3 presents trends in the share of answers to the question “*Who usually decides how to spend the money from the loan?*” across three waves of years. Over 70 percent of women answered that loan use decisions are made together with their husband, but the share of women who make decisions by themselves increased. Figure 3-4 presents the share of answers to the same question according to a household’s loan investment activities. Women’s discretion over loan use seems high when the loan is mainly used for household expenses, in contrast to when the loan is used for a non-farm business.

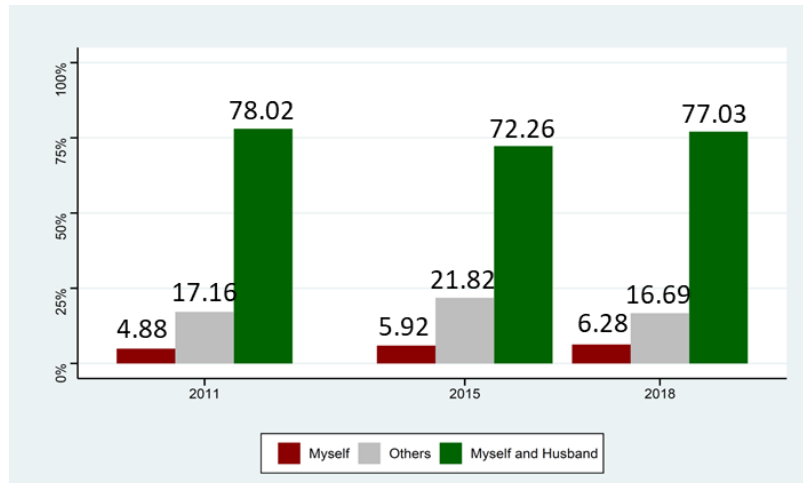


FIGURE 3-3

Who Made the Decision on Spending Loans?

Sources. Bangladesh Integrated Household Survey (2011, 2015, 2018)

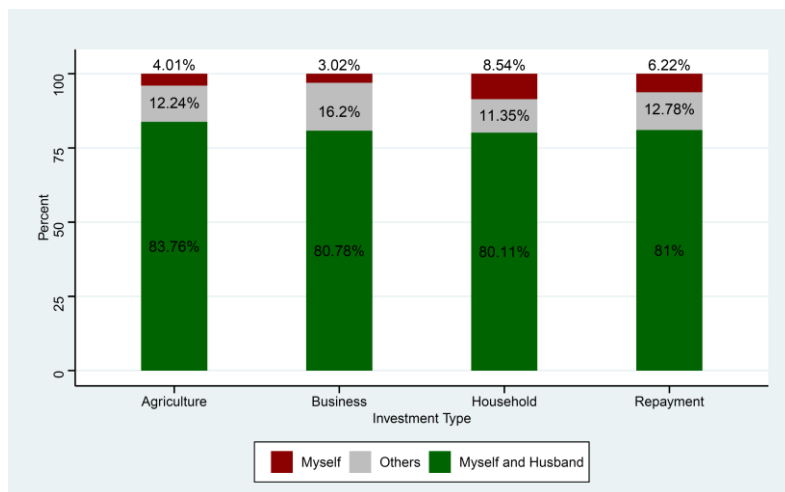


FIGURE 3-4

Women's Decision over Loan Use and Loan Invested Activities

Sources. Bangladesh Integrated Household Survey (2011, 2015, 2018)

RESULTS

First, this study investigates the linkage between women's control over loan use and a household's loan investment outcome. Table 3-3 presents the results. Each column displays the

results of the regression on different binary dependent variables indicating what loans are mainly used for: (1) agricultural activities, (2) non-farm business, (3) household expenses, (4) loan repayment. Column 2 shows that women’s control over loan use is positively related to the probability of a loan being invested in non-farm business activities, but this is conditional on the total amount of loan borrowed from MFIs. It is important to note that the average marginal effects of women’s control over loan use decrease as loan amount increases (Figure 3-5). At the mean level of total loan amount (6.11), women’s control over loan use is negatively related to the probability of loan investment in a non-farm business.

TABLE 3-3
WOMEN’S DECISIONS OVER LOAN USE AND LOAN INVESTED ACTIVITIES

	(1) Agricultural Activities	(2) Non-Farm Business	(3) Household Expenses	(4) Loan Repayment
Current Loan (log)	0.01 (0.01)	0.03*** (0.01)	0.01* (0.01)	-0.01* (0.01)
Loan Use Decision	-0.01 (0.08)	0.12* (0.07)	0.14 (0.11)	-0.05 (0.10)
Decision x Current Loan (log)	0.00 (0.01)	-0.03*** (0.01)	-0.01 (0.01)	0.02** (0.01)
Observations	409	409	409	409
Adjusted R^2	0.53	0.30	0.17	0.00
Control	YES	YES	YES	YES
Fixed Effects (individual, wave)	YES	YES	YES	YES
Model	OLS	OLS	OLS	OLS

Note. Sample is restricted to women aged above 18 who have borrowed loans from MFIs in 2011, 2015, 2018, excluding missing (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire, Individual clustered standard errors in parentheses. Level of education, literacy, age, age squared, marital status, household income (log), household savings (log), number of children/adult members, female headed household (dummy), household food/non-food expenditure controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

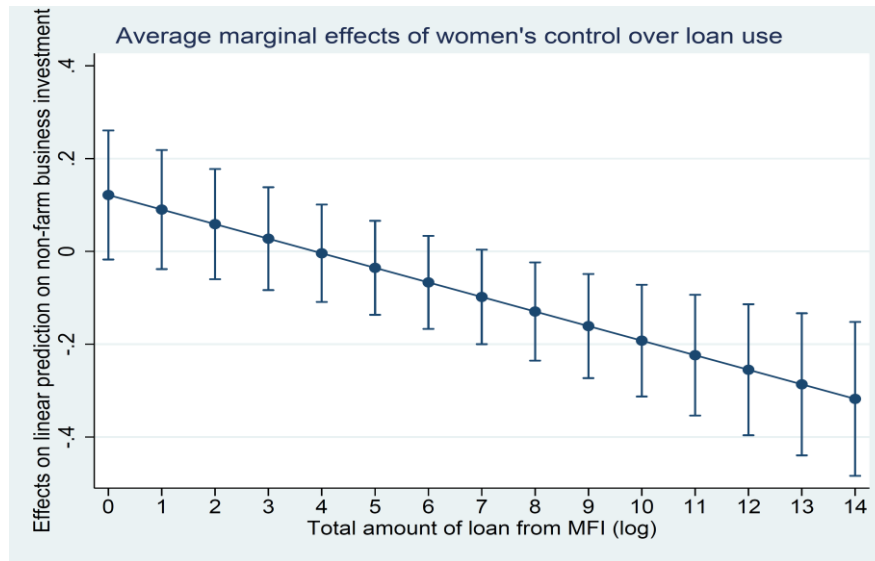


FIGURE 3-5

Average Marginal Effects of Women’s Control Over Loan Use on Linear Prediction of Non-farm Business Investment

Sources. Bangladesh Integrated Household Survey (2011, 2015, 2018)

In this analysis, I use women’s decision over loan use as an independent variable and loan usage as a dependent variable because decision precedes outcome at a conceptual level; however, caution is required in interpreting the direction of causality. As noted in previous studies, productive activities were highly gendered in Bangladesh in the 1990s, and this still appears to be the case; for example, households owning any non-farm business constitute approximately 43 percent of the sample, whereas women who have their own business constitute only about 3 percent (BIHS, 2011, 2015, 2018). Also, patterns in relationships between women’s decisions over loan use and loan-invested activities support the assumptions of previous studies that women’s control over loans is limited by gendered investment activities. It seems more natural to believe that women retain control over the loan when it is invested in women-dominated activities, but lose control when the loan is invested in men-dominated activities, as discussed in Section IV. However, no statistically significant relationship was found between women’s

decisions over loan use and loans invested in agricultural activities (Column 1), possibly because of variations in the gendered division of labor within agricultural activities; for example, livestock raising is considered women’s work and crop-farming is considered men’s work. Finally, the results in Column 4 also support the argument of previous studies that microcredit may impose a burden on women to repay the loan as women are legal debtors (Mayoux, 2000). In fact, the data suggest that in an increasing number of households, loans were mainly used to repay other loans; 11 percent in 2011, 13 percent in 2015, and 20 percent in 2018 (Figure 3-6). Certainly, this could be a natural phenomenon of financial development; for example, a process of substituting informal financial transactions (e.g., repay high-interest rate loans from money lenders) or increased leverage of individuals. However, if it is a sign of over indebtedness, the burden will be passed on to women rather than creating a virtuous cycle of reinvestment.

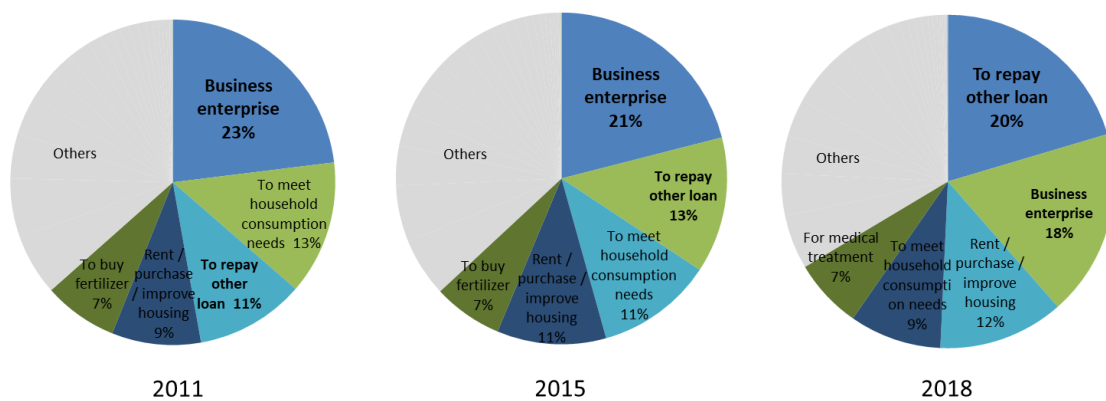


FIGURE 3-6

What Loans Are Mainly Used For?

Sources. Bangladesh Integrated Household Survey (2011, 2015, 2018)

Although it appears that women’s control over loan use is limited to non-productive household activities, it should be noted that it remains strongly related to women’s input into decisions made

about various productive activities (Table 3-4). Using ordered logit estimation methods, Table 3-4 presents estimates from pooled-cross sectional regression analyses of women’s control over loan use on women’s input into decisions made about various productive activities. Although the result only depicts simple relationships due to limited observations, it suggests that women’s decisions over loan use are positively related to their participation in economic activities within households, even for men-dominated activities such as non-farm business (Column 4). This supports Goetz and Gupta’s (1996) argument that in addition to direct control over loan use decisions, women may also have indirect control over men-dominated productive activities.

TABLE 3-4
WOMEN’S DECISIONS OVER LOAN USE AND
DECISION-MAKING INPUTS IN ECONOMIC ACTIVITIES

	(1)	(2)	(3)	(4)	(5)
Input in making decisions about:	Food crop farming	Cash crop farming	Livestock raising	Non-farm business	Wage employment
Loan Use Decision	0.58 (0.36)	0.36 (0.45)	1.17** (0.57)	1.75* (0.92)	2.09* (1.25)
Observations	416	252	344	110	113
Controls	YES	YES	YES	YES	YES
Fixed Effects	NO	NO	NO	NO	NO
Model	Ordered Logit	Ordered Logit	Ordered Logit	Ordered Logit	Ordered Logit

Note. Sample is restricted to women aged above 18 who have borrowed loans from MFIs in 2011, 2015, 2018, excluding missing (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire. Robust standard errors in parentheses. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Next, this study investigates how women’s control over loan use affects the relationship between women’s loans and household consumption. It begins by considering the simple relationship between women’s loans and household consumption, excluding the effect of women’s control

over loans. Table 3-5 reports the results. Each column presents estimation results for different household consumption items: (1) household’s total education, (2) men-reported education expenses, (3) women-reported education expenses, and (4) household’s total food expenses. Overall, no significant relationships were found between women’s loans and household consumption.

TABLE 3-5
WOMEN’S ACCESS TO MICROCREDIT LOANS AND HOUSEHOLD CONSUMPTION

	(1)	(2)	(3)	(4)
	Education Expenses (Total, log)	Education Expenses (Male, log)	Education Expenses (Female, log)	Food Expenses (Total, log)
Current Loan (log)	-0.01 (0.04)	0.03 (0.03)	0.02 (0.04)	-0.00 (0.00)
Observations	409	409	409	409
Adjusted R^2	0.60	0.79	0.67	0.77
Controls	YES	YES	YES	YES
Fixed effects (wave, individual)	YES	YES	YES	YES

Note. Sample is restricted to women aged above 18 who have borrowed loans from MFI in 2011, 2015, 2018, excluding missing (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire. Clustered standard errors in parentheses. Level of education, literacy, age, age squared, marital status, household income (log), household saving (log), number of children/adult members, female headed household (dummy), household food expenditure controlled for Column 1-3, household non-food expenditure controlled for Column 4. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

The next step in the analysis is to control for women’s decisions over loan use. The results indicate that for a woman who makes her own decisions over loan use, her monthly education expense is expected to be 116 percent higher than for women who do not, all other things are being equal (Table 3-6, Column 3). However, no statistically significant relationships were found

between women’s loan decisions and a household’s total education expenses, men-reported education expenses, and household food expenses (Columns 1, 2, and 4).

TABLE 3-6
WOMEN’S ACCESS TO MICROCREDIT LOANS, DECISIONS OVER LOAN USE,
AND HOUSEHOLD CONSUMPTION

	(1)	(2)	(3)	(4)
	Education Expenses (Total, log)	Education Expenses (Male, log)	Education Expenses (Female, log)	Food Expenses (Total, log)
Current Loan (log)	-0.01 (0.04)	0.03 (0.03)	0.02 (0.04)	-0.00 (0.00)
Loan Use Decision	0.23 (0.49)	-0.31 (0.42)	1.16** (0.48)	0.07 (0.06)
Observations	409	409	409	409
Number of individuals	187	187	187	187
Adjusted R^2	0.60	0.59	0.68	0.77
Controls	YES	YES	YES	YES
Fixed effects (wave, individual)	YES	YES	YES	YES

Note. Sample is restricted to women aged above 18 who have borrowed loans from MFIs in 2011, 2015, 2018, excluding missing (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire. Clustered standard errors in parentheses. Level of education, literacy, age, age squared, marital status, household income (log), household savings (log), number of children/adult members, female headed household (dummy), household food expenditure controlled for Column 1-3, household non-food expenditure controlled for Column 4. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

Based on the results in Table 3-5 and 3-6, this study tests whether there is any intermediating effect of women’s decisions over loan use on the relationship between women’s loan and women’s monthly educational expenses. Table 3-7 Column 3 reports estimated regression results for the equation specified in Section V, and Columns 1 and 2 compare the results in Table 3-5 and 3-6. These reveal a positive linkage between women’s loan and women’s education expenses,

but the effect is conditional on women’s control over loan use (Column 3, Panel A). To estimate the difference in predicted values depending on women’s control over loan use, linear combinations of coefficients at the mean level of the loan amount are presented in Table 3-7, Panel B. Women who have control over loan use are expected to have 254 percent (1.22 log points) higher monthly education spending on average than women who do not have control, all other things are being equal. In cases where women currently do not have a loan, women who usually make decisions over loan use are expected to have 207 percent higher education spending compared with women who do not make decisions over loans. In this case, women’s control over loan use could be related to decisions made over other family member’s loans or answers based on previous loan experience; hence, it may measure women’s economic empowerment or high bargaining power within a household.

TABLE 3-7

WOMEN’S ACCESS TO MICROCREDIT LOANS AND HOUSEHOLD CONSUMPTION
CONDITIONAL ON WOMEN’S DECISIONS OVER LOAN USE

	(1)	(2)	(3)
Education (Female, log)	Model 1	Model 2	Model 3
Panel A. Results			
Current Loan (log)	0.02 (0.04)	0.02 (0.04)	0.08** (0.04)
Loan Use Decision		1.16** (0.48)	2.07*** (0.59)
Decision x Current Loan (log)			-0.14** (0.06)
Panel B. Linear Combination of Coefficients (at log of current loan = 6.11)			
Loan use decision on current loan			1.70 [0.00]
No decision on current loan			0.48 [0.05]
Observations	409	409	409

Number of individuals	187	187	187
Adjusted R^2	0.67	0.68	0.84
Controls	YES	YES	YES
Fixed Effects	YES	YES	YES

Note. Sample is restricted to women aged above 18 who have borrowed loans from MFIs in 2011, 2015, 2018, excluding missing (due to no past and current loan experience) and middle response observations for the loan use decision questionnaire. Clustered standard errors in parentheses. P-values of linear combination in brackets in Panel B. Level of education, literacy, age, age squared, marital status, household income (log), household savings (log), household food expenditure, number of children/adult members, female headed household (dummy) controlled. Statistical significance at 1, 5, and 10 percent levels is indicated by ***, **, and *, respectively.

In sum, the findings of this study suggest that women’s control over loans is an important factor that can affect the impact of microcredit programs on social outcomes, especially for women. Most microcredit programs in Bangladesh target women in order to empower female entrepreneurs through financial inclusion and to achieve better social development outcomes, yet microcredit outreach itself does not seem sufficient. A large number of women do not make decisions over their loans, especially when used for a household’s productive activities.

CONCLUSION

Decades of efforts to promote financial inclusion and women’s empowerment in Bangladesh have led to a remarkable improvement in gender gaps in financial access. According to a recent report by the World Economic Forum (2022), Bangladeshi women have near-equal rights in terms of access to financial services. However, strong gender norms continue to restrict women’s rights on financial assets and activities. Using panel data on women’s decisions over loan use and a household’s investment and consumption outcome, this study reveals that women have limited control over loans for economic activities, specifically non-farm businesses. It also finds a

positive linkage between women's control over loan use and their input into household's economic activities, as well as higher education expenses for women.

The findings suggest that the intrahousehold bargaining process over loan use is a critical factor that should be considered when examining the impact of microcredit programs on social outcomes. The implicit assumption that loans directed at women will increase women's intrahousehold bargaining power may not hold when a strong gendered division of labor or norms are present in a household's financial decision-making processes. Therefore, program designs that can promote women's decision-making power over their loans and active participation in economic activities are essential to achieve the desired social goal of women's empowerment through microcredit programs.

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