Title: Microfinance and Women's Empowerment: The Effect of Microfinance on Fertility Rates and Female Workforce Involvement

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Introduction:

Women's empowerment and managing rapid population growth are very relevant issues in the field of development today. In this paper, I set out to determine how microeconomics plays into these issues. Microfinance institutions like BRAC and Grameen advertise their programs loaning to women as promoting female entrepreneurship, but in reality this is not always the case. In Bangladesh, of the borrowers who do use their loans for entrepreneurship, few do so independently of a male relative. This issue is so widespread that, on a field visit to a rural branch of Grameen bank, I learned from the branch manager that he would not give loans to a woman without a male figure in the household.

In order to investigate the theoretical reasons why women may not be included in the enterprises which they take out loans for, I will be modifying a model of fertility vs. income decisions presented by Ray Debraj in his textbook *Development Economics* to include the option of working in a small business. I will compare his original model with my modification to assess the impact of taking a microloan on women's work choices and fertility rates in the context of societies with significant gender inequality. This is relevant as a consideration for whether microloans are a truly effective way to promote women in the workforce. It also addresses whether microfinance is helpful or hurtful in addressing rapid population growth in low to middle income countries.

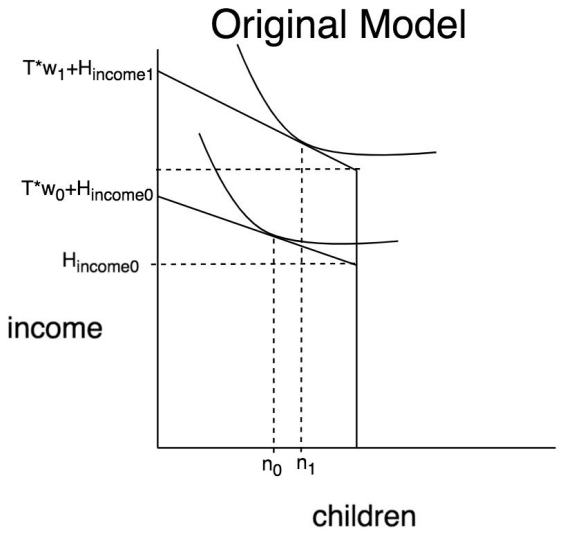
Section 1: Original model

The original model presented by Debraj uses a woman's budget constraint between income and children to explain rapid population growth in countries transitioning from

low-income to middle-income. The husband's wage is considered to be a given constant H_{income} . We assume a constant wage for the woman w . This assumption may not hold accurate to every scenario: in Bangladesh, specifically in rural areas, we saw that many women's income-generating activities were agricultural and not wage-based. Nonetheless, since my adaptation of the model assumes that self-employment is only made available after a loan is acquired, we will stick to the assumption of wage-based income for women. Women have a fixed amount of time that they can allot between income-generating activities and raising children T . We assume that raising a child takes a constant time of t per child. With these conditions, we can create a budget constraint for women between income and number of children:

$$I = (T - t * n) * w + H_{income}$$

I is the woman's total income, T is her total time available, t is the time commitment per child, n is the number of children she has, w is her wage, and H_{income} is her unearned income. This model shows that as countries move from lower to middle income status, since men's wages tend to rise faster than women's wages, the income effect dominates the substitution effect, and those for whom children are a normal good will choose to have more children.



Section 2: Assumptions of the Modified Model

In this modification of the model, I make the following assumptions:

1) The borrowing family uses their loan to start an independent business or other income-generating activity.
2) The income-generating activity displays decreasing marginal product of labor.
3) Both the male and female head of household have an outside work option of a constant wage.
4) Due to gender-wage inequality, the man's outside wage option is higher than the woman's outside wage option.
5) Due to societal pressure on the male head of household to provide for his family, he is the first family member to work in the income-generating activity, and will work until his outside option offers better returns.
6) Children are a normal good.

Perhaps the most debatable of these assumptions is that the family uses their loan for income-generating activities. As we saw in Bangladesh, many microloans are actually used for consumption smoothing or paying back existing loans. While this is a factor to consider, I will be focusing on loans that are used for income generation. There are a number of programs already in place in Bangladesh that ensure the use of loans for entrepreneurial purposes. One such example would be rural asset transfer programs, such as the BRAC TUP program, which guarantees that the loan is used for income generation by giving borrowers assets like livestock instead of actual money. Another example would be Grameen's small enterprise loans, which require the business to be consistently monitored to receive a loan.

The assumption that income generating activities financed by microloans have decreasing returns to labor is not particularly surprising. Most small enterprises, particularly agricultural ventures, which are popular with rural borrowers, exhibit decreasing returns to labor.

The assumption that both the man and woman of the household have an outside wage option could be questioned, but I would argue that it tends to be true if we relax our definition of an outside “wage”. For very poor borrowers, especially in urban settings, their outside option for income generation might be begging. While this is not technically a wage-based option, it also does not exhibit increasing or decreasing returns to labor: begging for one hour does not affect your expected income from begging the next hour. As for rural borrowers whose outside option is agricultural and does exhibit decreasing returns to scale, I will show in Section 5 that the implications of the model should hold true.

The fourth assumption is not particularly surprising. Most low and middle income countries tend to face significant gender inequality and pay gaps.

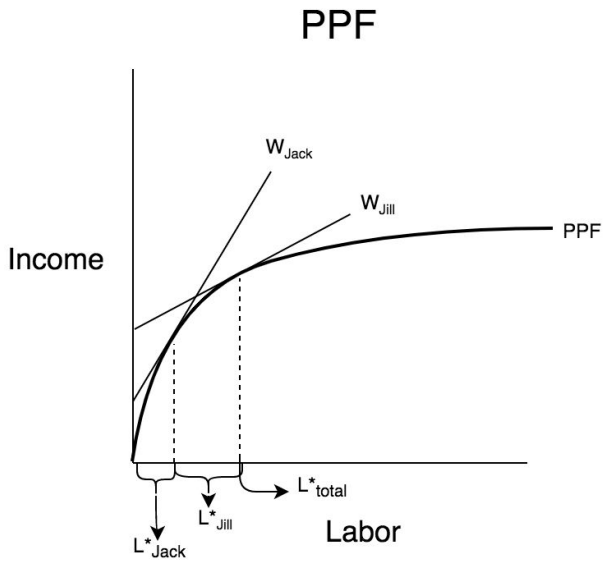
The assumption that the male head of household maximizes his own income instead of his family’s income may draw criticism, but from my own experience with microfinance in Bangladesh, I would argue that it often holds true. One could argue that this suggests the husband is not rational. I would, however, argue that this is not the case: there may be some negative externality on the husband’s social status from his wife’s labor hours in societies that frown upon women in the workforce or associate working women with poverty. In this case, maximizing the man’s income instead of the family’s income may actually maximize the family’s overall welfare .

While the assumption that children are normal goods could be debated, it is the most useful assumption to make when looking at this model. If we treated children as inferior goods, than any program that increased a family’s income would decrease the number of children they

decided to have, and there would be no need to look at how wage gaps and decreasing returns to labor affect a woman's fertility choices.

Section 3: Constructing the Model

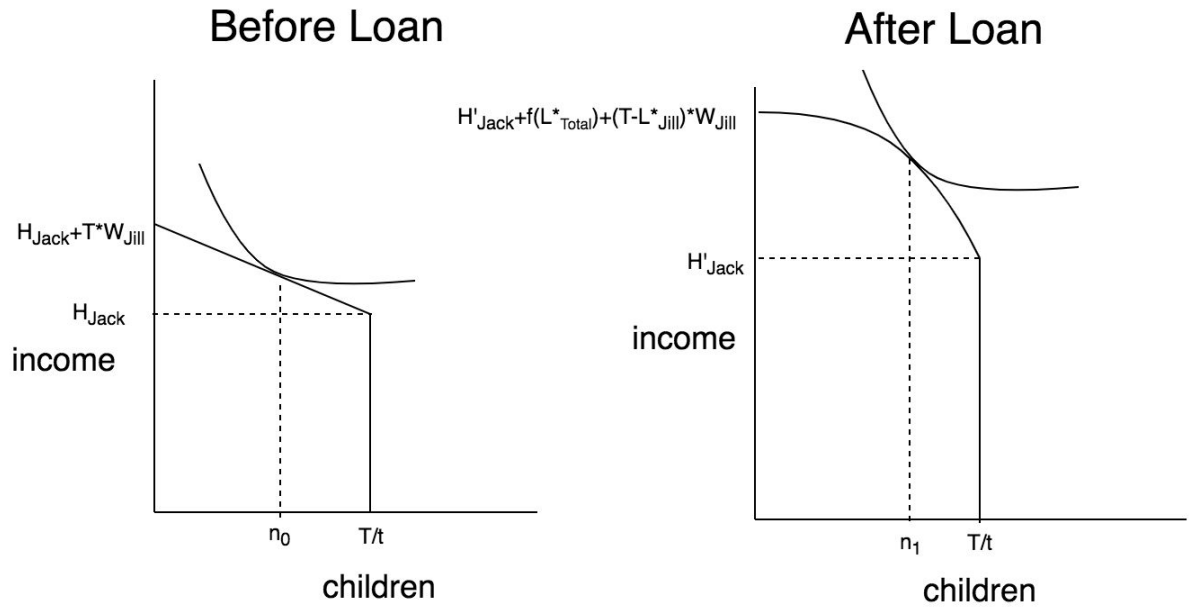
For the sake of simplicity in constructing this model, let's use the example of Jack and Jill, a husband and wife who are taking out a microloan to buy livestock. If we take the above assumptions as given, we know the production possibilities frontier of the family's loan enterprise shows decreasing returns to labor.



Since Jill's outside wage option is lower than Jack's, her optimal amount of labor with the livestock is higher than her husbands. This means that, even if Jack works in the enterprise until his marginal product of labor is equal to his outside wage option W_{Jack}, his wife can still work additional hours productively.

Because of the high initial returns to labor, we know that, so long as there is a point on the PPF where the slope is greater than the husband's outside wage option W_{Jack}, Jack will

make more income after the loan. This means that H_{Jack} increases from the original model to the modified loan model. We also see that the wife's marginal product of labor over the span of L^*_{Jill} is higher than with her original wage This means that Jill's maximum possible income will be higher than initially, and her marginal product of labor will be higher than initially for all points between L^*_{Jack} and L^*_{Total} . From this we can say that Jill's income vs children budget constraints before and after taking the loan look like this:



We can see that Jill experiences both an income and substitution effect from the shift in her budget constraint, making the effect of the loan on fertility ambiguous. We can, however, see how changes in different exogenous variables like outside wage options affect the shift. We see that Jill will experience an income effect from her husband's new income if H'_{Jack} is greater than H_{Jack} . We can express Jack's new income as:

$$H'_{Jack} = f(L^*_{Jack}) + W_{Jack} * (T - L^*_{Jack})$$

Where $f(L)$ is the loan enterprise's PPF function, and T is Jack's total time available for income generating activities. Jill's new budget constraint for all points where she works more than L^*_{Jill}, or at all values of n less than $\frac{L^*_{Jill}}{t}$, can be expressed as:

$$I = f(L^*_{total}) - f(L^*_{Jack}) + W_{Jill}(T - L^*_{Jill} - t * n) + H'_{Jack}$$

Her budget constraint for all points where she works less than L^*_{Jill}, or at all values of n less than $\frac{L^*_{Jill}}{t}$, can be expressed as:

$$I = f(L^*_{total} - t * n) - f(L^*_{Jack}) + H'_{Jack}$$

We can think of these income functions as having two parts: Jill's earned income, and her unearned income. Her unearned income is H'_{Jack}, and her earned income is the rest of the equation. We know that an increase in her unearned income will only create an income effect, causing an increase in n and a decrease in Jill's working hours. The rest of the equation, however, represents the returns on her own labor, and so contributes both an income and substitution effect. Assuming we are trying to maximize the increase in Jill's optimal working hours from the loan, we want to maximize her earned income and minimize her unearned income.

Both above equations for Jill's earned income contain the term $-f(L^*_{Jack})$, meaning that an increase in L^*_{Jack} decreases Jill's earned income and increases her unearned income. This means that, in order to maximize Jill's optimal working hours, we want to minimize L^*_{Jack}. L^*_{Jack} decreases as Jack's outside option W_{Jack} increases, and becomes 0 once there is no point on the loan enterprise PPF at which the slope is greater than Jack's outside option.

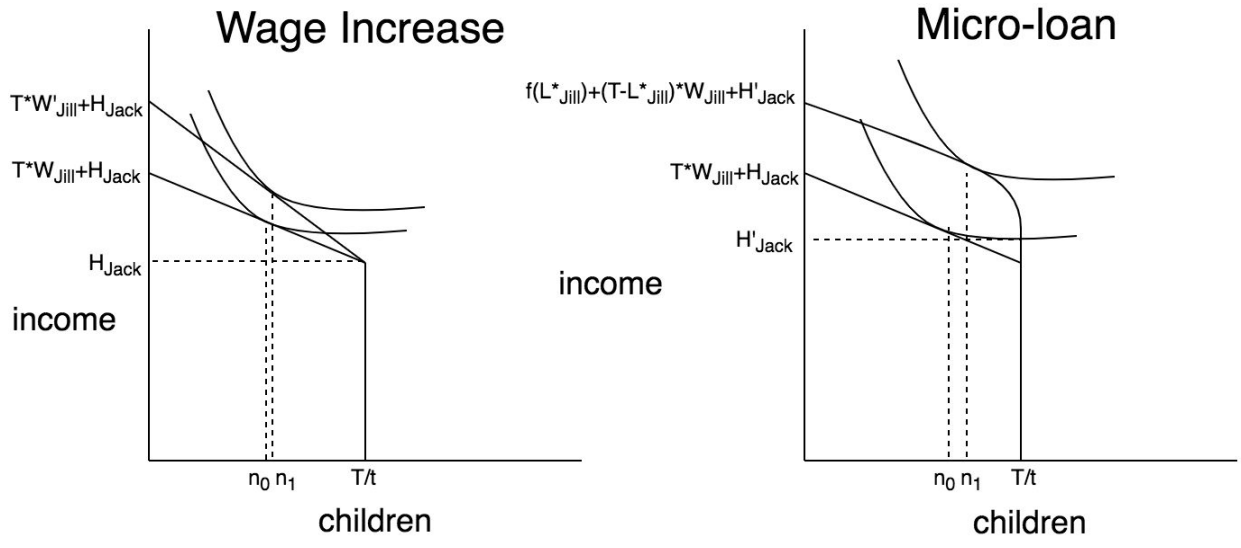
In the second budget constraint equation, we see that Jill will have a higher earned income and experience a substitution effect away from children and towards income if she works less than L^*_{Jill} hours. This is because at all points before L^*_{Jill}, her marginal product of

labor with the loan is higher than without the loan, raising the opportunity cost of children. This means that we want to maximize L^*_{Jill} in order to maximize the substitution effect away from children. In addition to lowering L^*_{Jack}, L^*_{Jill} can be increased by lowering Jill's outside wage option W_{Jill}.

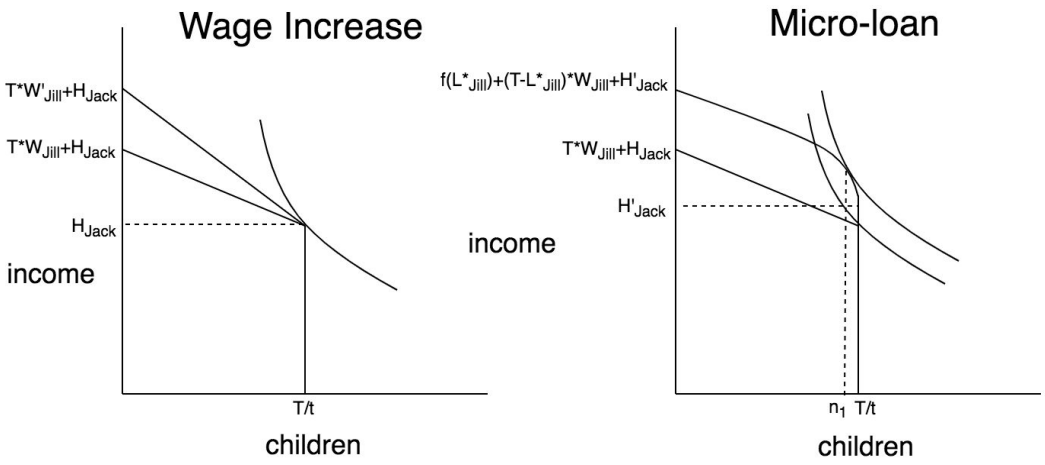
In summary, the model suggests that microfinance will be most effective at increasing Jill's working hours when W_{Jack} is high and W_{Jill} is low.

Section 4: Microfinance versus Female Wage Increases

Now let's compare the approach of microfinance with a simple increase in Jill's wage. We will use an example in which Jill's maximum earnings if she has no children is equal in both cases. We can see that the income effect from Jack's increased income, along with the lower MPL as n approaches 0, means that in many cases, wage increases are a more effective way of increasing female labor force participation and decreasing fertility rates than micro-loans. Even in the case that Jack does not work in the loan enterprise, high initial returns make Jill's income effect stronger with a micro-loan situation than with a wage increase. This suggests that programs employing women at fair wages, such as BRAC's Aarong factory in Bangladesh, may be more effective at encouraging women to participate more in the workforce and have fewer children.



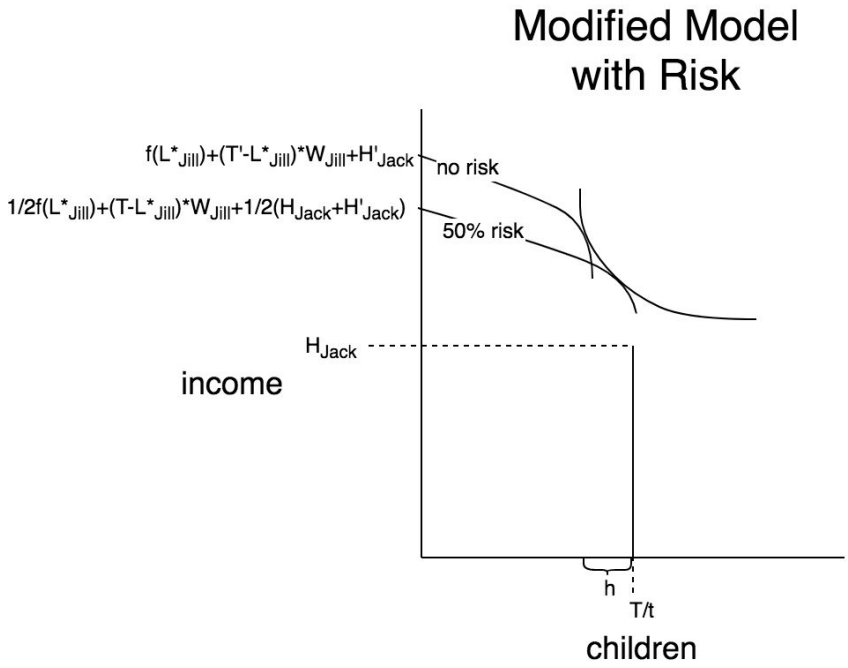
There is still a defense for using micro-loans over wage-based programs to lower fertility rates.



While microloans may not encourage as much labor per person, their higher initial MPL can make them more effective at encouraging women who only raise children to join the workforce.

Section 5: Uncertainty and Risk

One last thing to consider is uncertainty and the effect of time commitments on women's' choice of taking a loan. Let's say that loan enterprises without any guidance have a 50% success rate, and that success rate increases to 100% with h hours of training.



We see in the graph above that both Jack and Jill's incomes are affected by risk in the loan enterprise. In the example, Jill could reach at least the same indifference curve here while spending h hours on training than if she had no time commitment and no training. I say at least the same indifference curve because this model doesn't take into account risk aversion. Assuming that Jill is risk averse, she would actually be happier with the training.

This same scenario could be applied to families who already owned a business before taking out a loan. If Jack and Jill owned a struggling business with a 50% chance of failure without a supporting loan but no chance of failure with a supporting loan, and time commitments for the loan still existed, we would see the same result as the one above.

Policy Implications:

There are many policy implications we can take away from this model. In Section 3, we proved that higher relative and real male wages increase the effectiveness of microfinance in increasing female labor hours and decreasing fertility rates. This suggests that microfinance will accomplish these goals best in middle income countries, where wage gaps are high. It also suggests that microfinance will accomplish these goals best among middle income families, whose male wage is higher than the returns to labor in loan enterprises. Realistically, these policy implications may be complicated by differing social norms in different socioeconomic classes.

In Section 4, we proved that, compared to a flat wage increase, microfinance is less effective at decreasing fertility rates for women already involved in the workforce. We also proved that it is more effective at increasing workforce participation for women who do not already work. These findings suggest that microfinance will be most effective at increasing

women's work hours and decreasing fertility rates in communities with strong preferences for children and high initial fertility rates.

In Section 5, we prove that, so long as training sessions decrease the risk of a loan enterprise, they can both increase borrowers' welfare and decrease fertility rates. This suggests that, so long as training sessions are effective and borrowers believe that they are effective, they will not decrease borrowing rates, and will be beneficial overall. It is important to note that belief in the effectiveness of these training sessions is crucial, and if borrowers do not consider them beneficial, fewer women will choose to take the loan.

Possible Improvements:

The model I presented could be improved if it took into account different returns for male and female workers in a loan enterprise. While this would be less of a concern for agricultural investments, it could become an issue in something like a rickshaw business where certain tasks, like pedaling the rickshaw, are considered unfitting for female laborers to do. This could mean that, even if w_{male} is high enough that the husband has no reason to work in the business, the wife would be unable take over the leftover tasks. This consideration could even cause the family not to take the loan if the returns were significantly lower than w_{male}, even if they were higher than w_{female}, because the husband would be required to put in labor before the wife could productively work.

Another possible improvement to the model that I touched on previously would be incorporating a social stigma externality for the woman's labor hours. I originally ignored this as a simplifying assumption, but if the level of stigma changes by social class, it may affect which income groups are the best targets for microfinance programs. While I previously found that lower-middle income families are the best targets, if their stigma is significantly higher than that faced by lower income families, than lower income households may be a better target.

Conclusion:

Overall, the policy implications I have listed are in line with the current implementation of microfinance. Microfinance does tend to be implemented most often in lower middle income countries with high wage gaps. In Bangladesh, we saw that lower-middle and middle income families tended to be the recipients of loans, rather than the very poor. One could argue that the model even makes a case for borrowers like the garland business we saw in Dhaka: while the borrower's husband did make enough money to support them, her loan was useful in getting her involved in the workforce. The model also provides a theoretical explanation for why microfinance targeting women may not be as empowering as it sounds. With regard to risk, the model supports the policies of institutions like BRAC and Grameen, which both require training sessions as a prerequisite for loan borrowers. While we cannot say for sure whether borrowers consider the training helpful, the fact that both BRAC and Grameen face high demand for their loans suggests that the time commitment does not overshadow the usefulness of the loans.

Bibliography

Ray, Debraj. *Development economics*. Princeton, NJ: Princeton University Press, 1998.