

Final report



International  
Growth Centre

# Wheels of power

Long-term effects of  
targeting girls with  
in-kind transfers



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January 2017

When citing this paper, please  
use the title and the following  
reference number:  
S-34304-INB-1

DIRECTED BY



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# Wheels of power

## Long-term effects of targeting girls with in-kind Transfers

Shabana Mitra and Kalle Moene\*

January 27, 2017

### ABSTRACT

Expansion of opportunities for the female child may impact her aspirations given the prevailing social norms. Furthermore, the new social equilibrium arising from this expansion feeds back into the social norms. We develop a theory that embeds these features to motivate our empirical analysis. We study the long-term rather than the immediate effect of a one-time targeted transfer to school going girls: the cycle program in the Indian state of Bihar that began in 2006. We use novel survey data for 10,000 girls and boys in three states- Bihar, Jharkhand and Uttar Pradesh. Using a triple-differences framework we find a girl with a cycle is more likely to complete school (22.9%) or college (5%) compared to a girl who did not get the cycle. We also found that girls with cycle are 4.1% less likely to be working in agriculture. Girls with cycles are more likely to report not getting permission to work outside and not finding suitable work as the main reason for not working. a and more likely to report not having permission to work and not finding suitable work as reason for not working. These findings together suggest a change in their aspirations but also highlight the need for follow-through policies to remove the additional bottlenecks.

## 1 Introduction

What determines girls' abilities to live prosperous lives? At least two factors may be important; their life opportunities and their aspirations. Wide opportunities and reasonably high aspirations may lead to more prosperous lives. But both opportunities and

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aspirations are embedded in the economic and social conditions of society. Acquired aspirations, for instance, may not only be affected by the distribution of opportunities, but may also be seriously hampered by social constraints and norms and by what others do — no matter whether they function as role models or just as part of the social pressure. All of these factors constitute life frames that may affect everybody, or may be specific to certain groups, classes, or castes. In addition, the aspirations may relate to income, wealth and the social identity of the family and its placement in society.

Individual aspirations may themselves be shaped by the distribution of incomes and opportunities at the local level, and by actual gender related behavior. So, on the low end aspirations may be constrained by traditions, norms and the low effort of the comparison group. There may be constraints on the other end as well. The distance between own living conditions and those one aspires to achieve, what Genicot and Ray (2014) denote the aspiration gap, may be too big. Aspirations ahead may have strong effects on education and earnings, we assert, but aspirations that are too far ahead, may lead to idleness, waiting and misplaced efforts (Genicot and Ray 2014). Thus we focus on choices related to education and work where preferences of parents and kids are endogenous to opportunities, norms and girl-power.

All of this are not yet standard in economics. Some aspects of it are captured by recent advances in behavioral economics, starting with the contributions on reference based utilities by Kahneman and Tversky (1979) and the recent contributions like Koszegi and Rabin (2006). The role of aspiration levels also goes back to the writings of Herbert Simon in the 1940s. In his Nobel prize lecture in 1978 he summed the basic principles of his theory of aspirations, emphasizing how "aspiration levels .. tend to rise and fall in consonance with changing experiences. In a benign environment that provides many good alternatives, aspirations rise; in a harsher environment, they fall" (Simon 1978).

We are most directly inspired by Genicot and Ray (2014) who explore formally the formation of life plans that one aspires to and how aspirations and income evolve jointly. We build on these contributions to study gender inequality in aspirations related to education, work participation, earnings, marriage, and dowry — with an emphasis on the

choice of aspirations.

We are interested in gender issues in the local determination of income, education and aspirations, taking into account how outcomes may affect aspirations, and how gender specific aspirations affect outcomes. What individuals want for themselves, or for their children, is influenced by the lives of others. There may be social spillovers and aspirations may be adaptive also across gender. We are obviously also interested in exploring to what extent aspirations remain gender specific as opportunities improve. In general, aspirations can be contagious, both on the negative side and on the positive side. In addition aspirations may be affected by individual earnings which again may feed into new aspirations.

We assert that girls in Indian villages typically have low socially determined aspirations. The low level seems to be self-enforcing in the sense that low aspirations means that few make an attempt to take higher education, and few trials make few successes. If aspirations are formed by looking upward for female role models, the typical aspirations of girls and their parents remain low, including the aspirations just to step out of the house and try to improve living conditions. The cycle program to be discussed shortly, take this as a starting point.

Theoretically we explore how extending the set of opportunities that people face may empower specific groups, and how that may lead to a take-off in aspirations and performance. To study these aspects both theoretically and empirically we are particularly interested in how economic performance and outcomes change with more gender equality in opportunities, aspirations and incomes.

The aspiration framework that we have chosen, allows us to investigate how different kinds of reforms and interventions may affect life plans and aspirations both in the short and the long run. An intervention may have a two-fold impact: it may widen the aspiration window by allowing other role models both of the targeted individuals and their parents; and it may lower the cost of achieving the aspirations. In addition there may be strong indirect effects on others than the targeted group and we need to incorporate these feedbacks.

All this may alter the interaction both within and between genders, and of the local distribution of incomes and opportunities. It may also lead to cumulative changes, as the outcomes may feed into new average ambitions at the local level. Improvements may lead to higher ambitions and improved performance. Higher aspirations can thus indeed be good for social mobility, accumulation of human capital and for cooperation more generally at the village level and perhaps beyond.

Taken together girls' opportunities, aspirations, and earnings can constitute an equilibrium that is contingent on slowly adjusting social constraints — norms and the distribution of power across gender within the local community and the families. In this paper we discuss how an intervention that empowers the girls may change the entire social equilibrium. The intervention we consider is the cycle program in the state of Bihar in India.

The Mukhyamantri Balika Cycle Yojana (referred to as the cycle program) was initiated by the Government of Bihar in 2006. Under the scheme every girl who enrolled in class 9 would receive a cash amount of Rs. 2000 (later increased to Rs.2500) to buy a cycle that she would use to go to school. The initial indications of a success of the scheme were very favorable. School enrolment increased by over 30% in the first year (Muralidharan and Prakash 2016). Leakages from the scheme were below 5% (Ghatak et al. 2016).

To assess the impact of the cycle program by the increase in school enrollment only would not do justice to the program's wider intentions. A girl on a cycle is not just a girl going to school; she signifies a change in attitudes in the society. The total impact of such a scheme would include an assessment of the changes in attitudes of both men and women towards the role of women in society. It is in this broader context that we study the long-term impact of the cycle program.

Ten years since its inception, the first beneficiaries of the scheme would now be in their early twenties. Many important life decisions have been taken, including the decision to continue studying and in some cases decisions relating to marriage and children. We compare the outcomes of girls who benefited from cycle program with those that just missed it, being older by a few years (15-16 years as opposed to 13-14) in 2006. We also compare the girls from Bihar with those from Jharkhand and Uttar Pradesh where there

was no such scheme.

To do all this we collected data on 10,000 girls. Our Survey was conducted between January-April, 2016 in three states- Bihar Jharkhand and Uttar Pradesh. We used six districts in the 3 states, the districts were: Muzzafarppur and Madehpura ( in Bihar), Chatra and Giridih (in Jharkhand) and Sultanpur and Ghazipur (in Uttar Pradesh). The basic results of our investigation provide a positive and optimistic picture. A girl with a cycle has a higher probability to complete school or college compared to a girl who did not get the cycle, *ceteris paribus*. For example, a cycle-girl has nearly 30 percent higher chance of completing 10th grade and almost 25 percent higher chance of completing 12th grade than a girl who did not get a cycle.

At first sight the numbers look less impressive at the college level. Cycle-girls have a five per cent higher chance of completing college than girls who did not get cycles. Given the low percentage of girls who actually go to college in Bihar, however, this number is not low. We also find that that cycle-girls are more than four percent less likely to be working in agriculture. When asked why they were not working, however, almost half of the girls say that they would like to work but their families do not give permission and more than ten per cent say that they have not found suitable work.

On the social front the cycle program has lead to changing attitudes towards women. Cycle-girls are not only more likely complete school, attend college and look for productive work outside of agriculture — they are also less likely to be married early and more likely to delay child birth.

Previous findings of the program are necessarily more short run as none have had access to a broad survey based on long term results. Ghatak et al. (2016) show that the scheme was very well implemented with only three per cent of eligible households not having received the cash and only two per cent of household having received the cash without buying a cycle. They also show that due to demand side constraints households would prefer getting in-kind transfers rather than cash transfers. Muralidharan and Prakash (2016), use data from 2007-08 to show that immediately after the introduction of the program there was a 32 per cent increase in enrolment of girls into secondary school.

There is also an 18 per cent increase in the number of girls who show up for the secondary school certificate exam.

More generally our paper belongs to a literature focusing on female empowerment in India. Until recently a large part of this work has focused on the effect by mandatory representation in politics and find clear effects on the selection of political projects at the panchayat level (Chattopadhyay and Duflo 2004), on attitudes towards women (Beaman et al. 2009), on parents' aspirations for sons versus daughters (Beaman et al. 2012), on the reporting of violence against women (Iyer et al. 2012).

## 2 Aspirations, norms and empowerment

Being inspired by Genicot and Ray (2014), we have chosen a somewhat different modelling framework that allows us to focus on family choices of aspiration.

### 2.1 Setting individual aspirations

Consider a girl who faces opportunities  $V$  in the marriage market and the job market. An aspiration is a threshold that she aims at achieving. With an aspiration  $a$  it is difficult for her, or her family, to accept anything less valuable for her life choices than  $a$ . Let the aspiration be expressed by the same metric as the possible values  $v$  of the opportunities  $V$  that she may be offered. For example, schooling is not an end in itself. The end may be to get a job (or a spouse) that generates incomes. So if she aspires for  $y$  years of schooling, we express this as an aspiration  $a_i = a(y)$ , meaning that she will complete  $y$  years of schooling unless she gets an offer – a job, or a marriage – that is considered better than  $a_i$  when in school, and having finished school she only accepts offers  $v \geq a_i$ .

We can write the gross value of following the aspiration  $a_i$  as

$$W(a_i) = E[\max[a_i, V]] \tag{1}$$

where  $V$  may be stochastic. To follow the aspiration may be costly. We focus on two

types of costs.

The first type stems from efforts. It arises simply from the attempt to qualify for the aspiration and to find the opportunity that fulfils it. This cost is increasing in the level of aspirations, and we denote it  $c_i = c(a_i)$ . If the aspirations concern schooling the costs  $c_i$  would include the traveling costs that must be paid when there is no school in the neighbourhood.

The second type of cost is social. It may arise because aspirations beyond a certain level may violate norms  $m_i$  for girls in a social group, or caste,  $i$ . Upper castes and richer households may have higher values of the norm than others. The social costs are captured by  $\beta_i(a - m_i)$  where the parameter  $\beta_i$  is the strength of the social pressure behind the norm. Widening the aspiration window by including new role models can be interpreted as a rise in  $m_i$ .

How is the aspiration level for the girl set by the family? We suggest that the family follows the principle of indifference: having received an offer exactly equal to the optimal threshold  $a_i$ , the family should be indifferent between accepting this opportunity and rejecting it and continue looking for better opportunities, in which case it obtains the expected gross value of the aspiration minus the costs of holding it:  $W(a_i) - c(a_i) - \beta_i(a_i - m_i)$ . The principle of indifference implies that the optimal aspiration should be set such that

$$a_i = W(a_i) - c(a_i) - \beta_i(a_i - m_i) \quad (2)$$

In other words, the family will raise aspirations as long as the excess return of a certain aspiration  $W_i - a_i$  is higher than the pecuniary and moral costs  $c(a_i) + \beta_i(a_i - m_i)$  of the aspiration. Thus the optimal aspiration is where the access return equals the costs:

$$W(a_i, c_i) - a_i = c(a_i) + \beta_i(a_i - m_i) \quad (3)$$

If the opportunities have a cdf denoted  $F$ , we can use partial integration on (1) inserted



in (3) to obtain the optimality condition

$$\int_{a_i} (1 - F(v)) dv = c(a_i) + \beta_i(a_i - m_i) \quad (4)$$

Observe first that there is no gain of holding a more ambitious aspirations — the left hand side is declining in aspirations  $a_i$ . The gain of the aspiration comes from being more choosy in the opportunities that the family accept. The right hand side is increasing in aspirations  $a_i$ . Considering both sides of (4) we see that the optimal aspiration

- declines in the costs  $c_i$ : cycles to girls reduce  $c$  for each level of  $a_i$  and thus raise the aspiration level (to take education),
- increases in the norm  $m_i$ : cycles to all girls are likely to raise the norm  $m_i$  making it more socially acceptable to take more schooling etc
- increases in the power of girls, as empowering them reduces the effective strength of the social pressure  $\beta_i$ , to follow the norm: cycles to girls increase their power in the household

Clearly, when aspirations are connected to years of schooling the three bullet points emphasize how cycles may i) reduce the cost of schooling, ii) change the norms that constrain families' decisions to educate girls, iii) empower girls to follow their possible wishes to take education. Each change boosts aspirations.

When aspirations are connected to the 'quality of the spouse' in the marriage market the three bullet points emphasize how cycles may i) make the family more choosy about the groom, ii) affect the time of child bearing, and iii) empower the girls to have more of a say in possible choice of grooms.

In both cases, higher aspirations postpone fulfilment as the expected time to fulfil the aspirations is  $1/(1 - F(a_i))$ .<sup>1</sup> Hence, higher aspirations to improve earnings and material conditions are associated with delayed marriage, late childbearing, and long waiting for good jobs (outside agriculture). A girl, or a family, who has overly successful role models

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<sup>1</sup>The probability that it takes exactly  $N$  periods is  $F(a_i)^{N-1}(1 - F(a_i))$  where  $EN = 1/(1 - F(a_i))$ .

captured by high values of  $m_i$ , would chose overly high aspirations. The high aspirations lead to long postponements of fulfilment — periods that can be perceived as frustrating and meaningless waiting.

We can also use the first order condition in (4) to show that wider opportunities connected to higher geographical mobility of the girls, in itself may translate into higher aspirations.<sup>2</sup> So when higher mobility actually provides more good (and bad) alternatives that could not be reached before, aspirations rise. The bad alternatives do no matter as they will be disregarded, while the the good alternatives can be taken if they are reached, leading to higher ambitions.

## 2.2 Social multipliers and the possibility of multiple equilibria

Our little toy-model is only meant to set the stage for an empirical investigation of how an intervention like the cycle scheme may alter several aspects of the life chances of girls. The model may also incorporate how the local norms may change as girls become more mobile with cycles and how the power of girls within the family may change. As girls are able to move faster and safer to other places, they may become less dependent on their fathers and brothers. Such social changes — including how girls are treated or harassed — can spill over from family to family and among girls, magnifying the impact of the intervention.

As an example we now consider the obvious extension of how the aspirations of the local community, represented by the average aspirations  $\mathbf{a} = \sum_i a_i/n$ , over the relevant population of size  $n$ , feedback to the individual aspiration of each girl. Likewise, we could have incorporated how the empowerment of each girl depend on what the other girls are doing, or what the families of the other girls allow them to do.

To illustrate, we concentrate on the case of endogenous norms. In the long run the norm perceived by group  $i$  can perhaps be expressed as a fraction  $\gamma_i \leq 1$  of the average aspiration of the community, implying  $m_i = \gamma_i \mathbf{a}$ . In the illustration we also assume that

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<sup>2</sup>If wider opportunities can be considered as the result of a mean preserving spread in the distribution of opportunities — from the distribution function  $F$  to  $G$ . To be continued...

all families are alike, implying

$$m = \gamma \mathbf{a} \tag{5}$$

Each family takes  $\mathbf{a}$  as given when deciding its aspiration  $a$ . The first order condition (4) defines  $a$  as a function of  $m$  and the effort costs  $c$ , i.e.  $a = \phi(m; c)$ , where  $a$  is increasing in  $m$  with  $\phi' < 1$  since from (4)

$$\phi'(m; c) = \frac{\beta}{1 - F(a) + c'(a) + \beta} < 1 \tag{6}$$

Now– to err on the safe said – assume that the cycle program only has one direct effect via lower effort costs (of going to school). It may nevertheless have considerable cumulative social effects.

To see this, a cycle leads to a reduction in the cost  $c$ , represented by  $dc < 0$ , implying an immediate rise in local aspiration  $a$  equal to  $\phi'_2 dc > 0$  for each girl who gets a cycle. The rises in individual aspiration levels, however, affect the social norm  $\mathbf{a}$  which again feeds back into new rises of aspirations. In the long run these adjustments imply that  $a = \mathbf{a}$ .

What is the long run impact of  $dc < 0$ ? The immediate rise sets in motion a series of adjustments. Using  $\mathbf{a} = \phi(\gamma \mathbf{a}; c)$ , we find that the total change in the long equilibrium is equal to

$$d\mathbf{a} = \frac{1}{1 - \gamma \phi'} \phi'_2 dc \tag{7}$$

Since both  $\gamma$  and  $\phi'$  are less than unity the initial rise in the individual aspirations induces social reactions and feedbacks that sum up to a considerable social multiplier

$$\frac{1}{1 - \gamma \phi'} > 1$$

If, for instance,  $\phi' \approx .5$ , implying that a rise in the norm increase the individual aspirations

by half of the rise, and social norms change in a conservative manner with  $\gamma \approx .8$ , the social multiplier is nevertheless as high as almost 1.7.

The example shows how social adjustments of norms and empowerment can magnify initial changes caused by the intervention. The model may also have two locally stable equilibria. If we call the equilibrium that we just considered an interior equilibrium, there might be another locally stable situation that we may call (with a slight abuse of words) 'an aspiration free equilibrium' – denoted  $a = 0$  and  $m = 0$ . In this possible equilibrium the chosen aspiration is  $a = 0 = \phi(0, c)$  and the corresponding norm reflects 'the aspiration free' situation  $m = 0$ . This equilibrium can arise if there exist a value of the norm  $m = m_0 \geq 0$  such that  $\phi(m_0; c) = 0$ . Then all norms  $m \leq m_0$  give us minimal individual aspirations  $a = 0$  that can sustain the norm  $m = 0 \leq m_0$ .

If we start in such an aspiration free equilibrium, an intervention like the cycle program may have even stronger impacts in the long run. It may eliminate the aspiration free equilibrium all together (as lower values of  $c$  may imply that there does not exist a value  $m_0 \geq 0$  of the norm that can sustain  $a = 0$ ). When this is the case the intervention of the cycle program does not only change the interior equilibrium to entail higher aspirations, but may also lead some communities to move gradually from the aspiration free equilibrium to the long run interior equilibrium – a potentially great social leap forward.

In the empirical discussion, however, we are not able to distinguish between changes of equilibria and changes within an equilibrium. Yet we can find support for basic effects of of cycles program on school enrollment, school completion, the timing of marriage and child bearing, and on more social indicators.

### 3 Data

The Survey was conducted between January-April, 2016 in three states- Bihar, Jharkhand and Uttar Pradesh.

### 3.1 Districts and villages

We used six districts in the 3 states, the districts were: Muzzafarppur and Madehpura ( in Bihar), Chatra and Giridih (in Jharkhand) and Sultanpur and Ghazipur (in Uttar Pradesh). The districts in Bihar were chosen so that they represent different levels of development. We put restrictions on the selection of districts. First, we chose districts that were not adjacent to Patna. This was done to ensure that we were capturing the effects of the scheme in a typical Bihar setting without the influence of the capital of the state or neighbouring districts. The second condition, was that we did not chose any district that shares a border with any other state. This was done to reduce the spillover from the neighbouring states. Within these conditionalities one low development district (Madhepura) and one high development district (Muzzafarpur) were chosen.

Once the districts in Bihar were chosen , the districts in Jharkhand and Uttar Pradesh were chosen so as to have similar relative development as the ones in Bihar. So Chatra and Ghazipur were at similar levels of development as Madhepura; Giridih and Sultanpur are similar to Muzzafarpur. The matching was based on access to public services as given by the 2001 Census (which pre-dates the period we are interested in). A total of 150 villages were surveyed and 3500 households within these villages were surveyed. The villages were randomly selected from each district and 20 households were randomly selected from each village, as long as they had at least one member of the household between 12-35 years present. Figure 1 shows the villages that were surveyed in the six districts covered by the survey.

Table 1 shows that Bihar and Jharkhand have been at similar levels of development on educational and other social outcomes prior to the 2005. The old state of Bihar bifurcated into Bihar and Jharkhand in 2000, so it is not surprising that they still look similar to each other. However, the language and culture in most parts of Jharkhand are dissimilar to that of Bihar. The language spoken in Jharkhand is different and the state has a large proportion of tribals with approximately 30% of the population belonging to the scheduled castes.<sup>3</sup> The social norms between Bihar and Uttar Pradesh are similar and

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<sup>3</sup>In the survey we use only self reported caste group status so we have several people in Jharkhand

	Bihar	Jharkhand	Uttar Pradesh
No. of Observation	2461	2098	2329
General Caste (%)	14.019	7.960	6.144
OBC(%)	38.033	53.098	39.073
SC/ST(%)	20.236	15.920	31.430
Hindu (%)	89.679	79.743	94.161
Average age	19.886	19.694	20.079
	(7.374)	(7.205)	(6.803)
Average household agricultural land	2.056	3.073	2.300
	(3.158)	(4.033)	(2.850)
Asset Index	2.902	3.108	4.444
	(1.58)	(1.602)	(2.01)
Female (%)	58.635	60.724	59.081

Table 1: Demographics of the population. This is based on the data for girls and boys aged 12-35 years in the data from the Survey. The numbers in parenthesis are standard deviations.

the languages and customs overlap significantly.

	Bihar		Jharkhand		Uttar Pradesh	
	Boys	Girls	Boys	Girls	Boys	Girls
Completed School	21.135	10.085	23.383	9.192	51.779	40.604
Completed college	7.181	1.824	9.477	1.871	27.952	19.585
Currently studying	63.065	47.609	64.320	47.410	63.169	50.872
Married (%)	25.540	45.877	25.728	46.154	22.455	36.192
Average marriage age	19.504	16.568	19.374	15.978	19.254	16.816
	(3.254)	(2.466)	(3.271)	(2.584)	(4.00)	(3.498)
Average no. of children		3.076		2.905		2.713
		(1.484)		(1.328)		(1.291)
Working(%)		19.930		15.756		13.606
Percentage got cycle		18.780		13.579		3.125

Table 2: Descriptive Statistics: of some of the outcome variables. This is based on the data for girls and boys aged 12-35 years in the data from the Survey. The numbers in parenthesis are standard deviations.

### 3.2 Girls versus boys

Table 2 shows the differences between girls and boys in the data for some of the outcome variables for the three states. We see that for most of the education variables boys outperform girls. There are significant differences between completion of school rates for girls and boys in all three states — for Uttar Pradesh more than double of those of Bihar reporting that they don't know which group they belong. This explains the lower number of self-reported SC/STs in Jharkhand in the sample here.

and Jharkhand. The difference between the three states is smaller, implying that there might be some convergence in the completion rates over time. The percentage of girls and boys who have completed college is very low in Bihar with less than 2% of the girls having completed college. The number of boys is also low when we compare it to Uttar Pradesh. There are similarities between Jharkhand and Bihar, both having few college degrees. Table 2 also shows that there are about 20% girls in Bihar who work in the age group 12-35 years. The numbers are lower for both Uttar Pradesh and Jharkhand.

### **3.3 Uptake**

The last row of table 2 gives the percentage of girls in the sample who have been given cycles by the government. For all girls between ages 12-35 years in the sample, 18.78% of the girls from Bihar have been given cycles whereas 13.6% for girls in Jharkhand and 3.1% girls in Uttar Pradesh have. These numbers must be interpreted with care. One must not confuse them with the uptake of the scheme. First this group includes all girls in the age group 12-35 years. Since the scheme was started in 2006 for girls entering 9th grade, girls about 25-26 years in 2016 are girls who completed the 9th grade before the program was rolled out. Further, girls under age 14 are unlikely to have reached 9th grade and so are also ineligible. Also among the girls between ages 14 and 25 we would have to exclude the girls who went to private schools, since they were also ineligible.

Figure 1 shows the percentage of girls for each age group who have got the cycles. We see that the numbers were better when the scheme was first rolled out and have fallen in the recent times. The second line in the figure shows the girls who were eligible to get cycles, those who studied till 9th grade at least and so would have got the cycle. These percentages reflect the “eligible” girls who received the cycle from the government. The difference between the two lines are the girls who either dropped out of school after class 8 or did not even study till class 8, so would have never been able to participate.

Recently the uptake has shown a decline. This may be a concern. The decline may indicate that there is now more leakages in the program either from the government or from recipients. It could also be caused by mean reversion as family heads do not allow

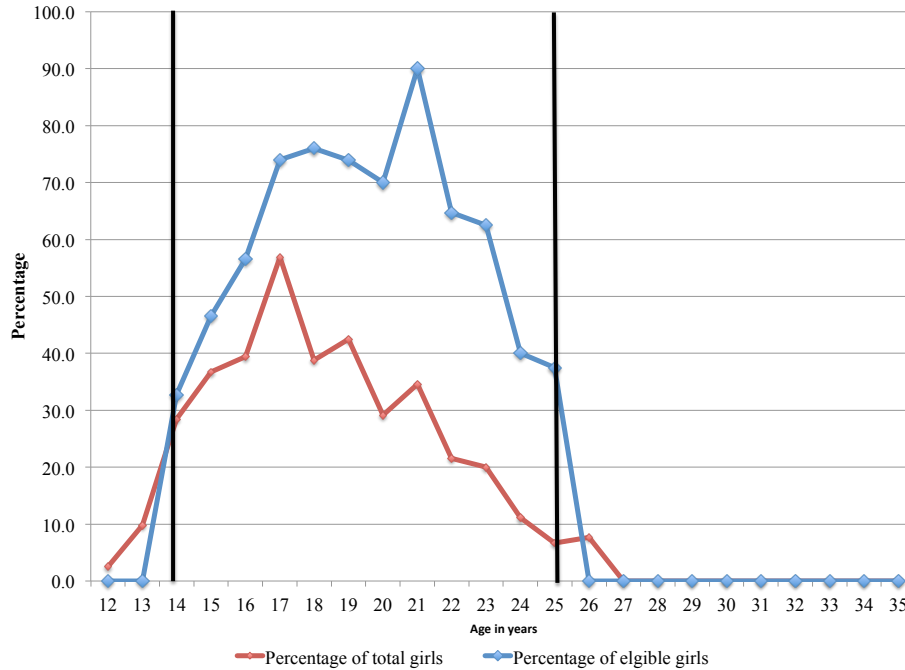


Figure 1: **Age-wise distribution of uptake of cycle program** *Notes:* At each age we see the percentage of girls of the total girls from Bihar in the sample who received the cycle from the government. The second line shows the percentage of girls who received the cycle from girls among those eligible to get the cycle. The age groups between the vertical lines are the ones exposed to the program.

their girls to get bikes. This, however, does not seem to be the case. The program is still popular among parents. Another explanation could be just the opposite: girls have already by the time they reach class 9 received a cycle from their families. With an uptake of the program around 50%, almost 80% of those who do not use the scheme say they already own a cycle. This may support the claim that the cycle program has changed the social norm, to the extent that parents are willing to give their girls cycles even before they are eligible to get one from the government.

In the next section we provide details on our empirical strategy for using the data we have just described.

## 4 Empirical Specification

Launched in 2006 across the whole state of Bihar, the Mukhyamantri cycle yojana has targeted girls enrolling into class 9, giving all girls who were 12-13 years old or younger access to the program over the last 10 years of its continuous operation. Ten years on,



the first cohort of beneficiaries are now 22-23 years old and girls who were a year or so older (girls 25 years and above) missed out on the program. A comparison of these two groups forms the core idea behind our identification strategy.

First of all, we compare girls who are 25 and above (but under 35 years) with girls who are younger. Secondly, we compare them to the boys in their respective cohorts to difference out the effects on any universal schemes. Finally, we compare them to girls and boys from Jharkhand and Uttar Pradesh.

Though Jharkhand would be more suitable for some questions of higher education, it may provide less of a comparison for other questions relating to the general social status of women. This is so, since Jharkhand has a higher tribal population, that generally has customs different from non-tribal groups. For some of our questions we can use districts in Uttar Pradesh as the comparison. Uttar Pradesh also shares a border with Bihar and along the border the language spoken is the same and sometimes marriages occur across the state border. Thus we have more reason to believe that the social norms would be similar.

To find the impact of the cycles on schooling, marriage, and social behavior we use a set of individual and household level controls  $\mathbf{X}_i$  to estimate versions of a generic equation where the dummies  $f_i$ ,  $c_i$ , and  $s_i$  play an essential role

$$y_i = \beta_0 + \beta_1 f_i + \beta_2 c_i + \beta_3 s_i + \beta_4 f_i c_i + \beta_5 s_i c_i + \beta_6 f_i s_i + \beta_7 f_i s_i c_i + \alpha \mathbf{X}_i + \epsilon_i \quad (8)$$

The subscripts  $i$  refer to individuals between ages 12 and 35 years.  $f_i$  is a dummy variable that takes the value of one if the observation is female;  $c_i$  is a dummy variable that takes the value one if the person got a cycle from the government;  $s_i$  is a dummy variable that takes the value one if the observation is from Bihar, zero otherwise. These three partial effects and the four interactions together give us the triple difference estimates.

The dependent variables of interest here are educational, occupational and social outcomes such as whether the individual has completed school or college, is currently studying, is working or not; age at marriage, whether they are married or not, the number of

children they have. Some of these may be binary variables in which case we use the above structure in a probit framework rather than a linear OLS model.

Since it is a triple difference framework, the partial effects of gender, belonging to Bihar and access to the cycle through the cycle program are not just one coefficient but represented by the following equations. Equation 9 captures the difference between boys and girls in the the outcome variable

$$b_{bg} = \beta_1 + \beta_4 c_i + \beta_6 s_i + \beta_7 s_i c_i. \quad (9)$$

Equation 10 captures the difference between an individual being from Bihar and elsewhere on their achievement of the outcome variable. In other words  $a_B$  represents the partial effect of being in Bihar on the outcome variable. Similarly, equation 11 is the effect of having a cycle through the Bihar cycle program on the specific outcome variables.

$$b_B = \beta_3 + \beta_5 c_i + \beta_6 f_i + \beta_7 f_i c_i; \quad (10)$$

$$b_{CB} = \beta_4 f_i + \beta_7 s_i. \quad (11)$$

For example, the magnitude of the effect of the cycle program on girls from Bihar will be  $\beta_4 + \beta_7$  compared to girls from Uttar Pradesh or Jharkhand and also compared to the effect on boys.

Finally, to capture the partial effect of being in Bihar versus in any of the other two states for a girl with a cycle we will consider the sum:  $\beta_3 + \beta_5 + \beta_6 + \beta_7$ , giving us the magnitudes of the differences. Since most of the time we will be working with binary outcome variables to get the exact effect, we will look at the marginal effects.

## 5 Results

We are interested in accessing the impact of the cycle program on two main aspects of a person's life. First, we would like to test whether the initial change that the scheme

provides in class 9 is able to push the girls towards completing their twelve years of education and pursuing college and also entering the labor force. While doing this exercise we have to keep in mind that historical context of the study. Before 2005, for the whole of Bihar, the percentage of girls who have a college degree is less than 1% and the numbers of girls who are working outside of agriculture is also very low. Therefore the social context of Bihar was such that girls did not complete school or pursue college education or work outside of the house (if they are not working in agriculture).

Second, we would like to test whether the fact that girls were able to leave the house and independently participate in an activity (namely going to school) has had an effect on the life choices they make. By seeing if families with girls with cycles make marriage decisions different from families with girls without cycle, we would like to see (though indirectly) if girls feel more empowered to reach their wishes in their families. We directly test if the cycle results in delay in marriage and so also delay in starting their reproductive lives.

We also ask them if they are constrained in their mobility and test whether girls who got cycles are less likely to be immobile. The final set of regressions relate to harassment. For harassment we can have two types of effects. The first is that since girls with cycles are less constrained in their movement they are more likely exposed to harassment. Second is the reporting bias: since girls with cycles feel more empowered they are more likely to report incidences of harassment than girls who are less confident. Alternatively there can be the other effect that since girls are more visible in the public spaces now, boys and men have been able to adjust their social norms and there is actually less harassment. I think there will be first a rise in harassment and then a fall in reported harassment as society “accepts” girls in the public spaces.

The outcomes of interest for us can be divided into three broad categories: Choices and outcomes related to education, labor force participation and social and family choices of marriage and children. We will address all three broad categories in order.

	[1]	[2]	[3]	[4]	[5]
Female	-0.504***	-0.676***	-0.578***	-0.379***	-0.453***
	-0.044	-0.048	-0.052	-0.058	-0.061
State = Bihar	-0.524***	-0.631***	-0.525***	-0.507***	-0.838***
	-0.081	-0.081	-0.098	-0.106	-0.115
Received cycle from Govt		1.293***	0.831***	0.699***	1.029***
		-0.116	-0.119	-0.14	-0.137
Female*Bihar			-0.374***	-0.245**	-0.199*
			-0.109	-0.118	-0.118
Female*Bihar* Cycle			1.072***	0.829***	0.516**
			-0.21	-0.229	-0.224
State = Jharkhand					-0.779***
					-0.096
Whether Married or Not				-0.915***	-0.821***
				-0.057	-0.058
General Caste				0.722***	0.672***
				-0.105	-0.103
OBC Caste				0.376***	0.433***
				-0.068	-0.067
Muslim				-0.464***	-0.245**
				-0.1	-0.103
Total Agricultural land in Acres				0.025***	0.035***
				-0.007	-0.008
Number of observations	3,871	3,871	3,871	3,871	3,871
Log-Likelihood	-2,474.24	-2,351.69	-2,330.58	-2,054.86	-1,967.58

Table 3: Completed High school: Sources and notes: The dependent variable in all these regressions is whether a person has completed a class 10 education or higher. The sample includes currently studying and also those who dropped out at any stage after completing class 10.

### 5.1 Education: completion of the 10th grade

The direct effect of getting a cycle would be that more girls complete the class 10 exam. This is the intended consequence of the cycle program. Table 3 shows the probabilities of completing at least grade 10, or high school. In general girls are less likely to have completed high school and people from Bihar are less likely to have completed high school. However, when we look at the effect of having access to the cycle program on the probabilities, we see that cycle-girls from Bihar are more likely to have at least completed high school.

The magnitude of the partial effect of girls having access to cycles is of the order of 1.5 in all specifications, implying that a girl on a cycle in Bihar is 27% more likely to have at least completed class 10 than a girl who did not have access to the program.

This naturally shows that cycles in Bihar were able to remove some of the bottlenecks to completing school. In fact the probability of girls with cycles completing high school is 91% compared to the probability of a girl without a cycle completing high school is 64%. This shows that girls with cycles are less likely to drop out of school before class 10 – a direct validation of the Murlitharan and Prakash (2016) result who used secondary data.

The control variables in table 3 have the predicted signs on the coefficients: Married girls are less likely to have completed high school, SC/ST caste are less likely to have completed high school, and the more prosperous individuals are more likely to have completed school.

	[1]	[2]	[3]	[4]	[5]
Female	-0.379*** (0.028 )	-0.458*** (0.032)	-0.379*** (0.039)	-0.056 (0.054)	-0.048 (0.054)
State = Bihar	-0.031 (0.037)	-0.072** (0.035)	-0.018 (0.051)	0.047 (0.066)	0.128* (0.068)
Received cycle from Govt		0.699*** (0.081)	0.114 (0.082)	-0.097 (0.107)	-0.168 (0.111)
Female*Bihar			-0.241*** (0.061)	-0.127* (0.076)	-0.133* (0.076)
Cycle*female*Bihar			1.273*** (0.139)	1.312*** (0.217)	1.386*** (0.22)
State = Jharkhand					0.185*** (0.055)
Whether Married or Not				-2.477*** (0.054)	-2.493*** (0.054)
General Caste				0.192*** (0.056)	0.215*** (0.058)
OBC Caste				0.249*** (0.047)	0.241*** (0.047)
Muslim				-0.145** (0.066)	-0.195*** (0.068)
Total Agricultural land in Acres				0.022*** (0.006)	0.020*** (0.006)
Number of observations	6,888	6,888	6,888	6,888	6,888
Log-Likelihood	-4,669.72	-4,606.99	-4,559.37	-2,622.77	-2,616.10

Table 4: Currently Studying Sources and notes: The dependent variable in all these regressions is whether a person is currently studying students for any grade after class 9, the year in which the girls become eligible for the cycle program.

## 5.2 Education: still studying or maybe completing the 12th grade

Since the cycle program has been continuously running for ten years the first cohort of girls have not only completed high school they have already made choices to continue studying further or not. Table 4 gives the probability of being currently enrolled in school or college. Controlling for this basic demographic characteristics such as age, caste, religion, and wealth (as measured by total agricultural land holding) we see that girls from Bihar who have had access to the cycle program are more likely to be currently enrolled in school.

In general, girls are less likely than boys to be enrolled in school or college. Girls from Bihar are in particular unlikely to pursue education. Yet, the effect of cycles on girls from Bihar is positive, telling us that girls are more likely to be studying if they have had access to cycle program. We can supplement this by looking at secondary school completion rates. Table 5 gives the probabilities of completing secondary school for people in the age groups 18 to 35 years. We see that having a cycle gives the girls an advantage, they are more likely to complete school. The magnitude of the effect reduces as we go from the direct completion of class 10 to the completion of twelve years of school. Yet, the pattern is clear: girls who get a cycle are in general more likely to complete school.

## 5.3 Education: college

There are usually schools within a biking distance of the villages. When we look for colleges in the districts, however, we find that there are really few of them. The growth of colleges has been extremely low in the period 2001 and 2011 (ref). Bottlenecks remain severe on the college level. Students therefore need to travel long distances to attend college. The cycle ceases to help as mode of transport. Therefore focusing on the completion of college, we are now moving from direct impacts to indirect effects, including how the cycle program may change how people perceive their opportunities and constraints.

The small impacts of the cycle program on the completion of college, shown in table 6, illustrate nevertheless possible changes in attitudes towards the importance of education to girls in the society as a whole including perceptions of mobility. If distance was perceived

	[1]	[2]	[3]	[4]	[5]
Female	-0.409*** (0.047)	-0.499*** (0.05)	-0.411*** (0.055)	-0.239*** (0.06)	-0.326*** (0.064)
State = Bihar	-0.588*** (0.089)	-0.641*** (0.089)	-0.535*** (0.108)	-0.510*** (0.118)	-0.865*** (0.119)
Received cycle from Govt		0.640*** (0.101)	0.309** (0.131)	0.189 (0.141)	0.600*** (0.138)
Female*Bihar			-0.406*** (0.114)	-0.313** (0.123)	-0.260** (0.124)
Female*Bihar* Cycle			0.881*** (0.18)	0.668*** (0.192)	0.278 (0.187)
State = Jharkhand					-0.961*** (0.089)
Whether Married or Not				-0.680*** (0.058)	-0.568*** (0.058)
General Caste				0.661*** (0.103)	0.611*** (0.096)
OBC Caste				0.389*** (0.07)	0.468*** (0.069)
Muslim				-0.540*** (0.101)	-0.276*** (0.095)
Total Agricultural land in Acres				0.018** (0.007)	0.029*** (0.008)
Number of observations	3,873	3,873	3,873	3,873	3,873
Log-Likelihood	-2,068.76	-2,040.99	-2,026.51	-1,856.97	-1,740.31

Table 5: Completed school: Sources and Notes: This table refers to individuals who have completed school i.e. have successfully taken the end of school exam conducted at the end of grade 12 or have completed years of education more than 12.

to be a reason for not sending their daughters to college, then together with the fact that not many new colleges have been built, we are tempted to conclude that it is the social norm that has changed: that more mobile girls have made traveling out to attend college more acceptable. We return to this later.

	[1]	[2]	[3]	[4]	[5]
Female	-0.396*** (0.066)	-0.412***	-0.370***	-0.200**	-0.271***
State = Bihar	-0.739***	-0.743***	-0.636***	-0.582***	-0.882***
Received cycle from Govt	-0.117	-0.118	-0.149	-0.155	-0.156
		0.203	0.197	0.121	0.383*
		-0.159	-0.18	-0.195	-0.198
Female*Bihar			-0.236	-0.227	-0.18
			-0.173	-0.169	-0.172
Female*Bihar* Cycle			0.08	-0.189	-0.415
			-0.401	-0.407	-0.41
State = Jharkhand					-0.967***
					-0.121
Whether Married or Not				-0.643***	-0.526***
				-0.088	-0.089
General Caste				0.598***	0.549***
				-0.106	-0.101
OBC Caste				0.268***	0.342***
				-0.088	-0.09
Muslim				-0.519***	-0.219
				-0.171	-0.169
Total Agricultural land in Acres				0.022**	0.032***
				-0.011	-0.011
Number of observations	2,995	2,995	2,995	2,995	2,995
Log-Likelihood	-922.07	-921.25	-920.34	-848.18	-791.22

Table 6: Completed College Sources and Notes: This table refers to individuals who have completed college or have a degree more than an undergraduate degree.

#### 5.4 Working outside agriculture

Education by itself is not usually an end goal, the idea is that education is valued as a way to get work outside agriculture. Therefore given that girls are getting more educated is it also the case that they are more likely to go out and work. Is there an effect on labor force participation from the long term effect of the cycle program. In the survey we ask if the responded (female) is engaged in any work for pay (where pay could also be in-kind).

For the girls who are not in school or currently studying we find that the they are less likely to working for pay if they had access to the cycle program (see Table 7). This goes contrary to our notion of social change at first pass. There are two crucial points that are important to interpret the result: First, if the cycles result in more girls completing school and going to college, these girls are less likely to be working currently since they



may enter the labor force later. Second, the kind of work done by most women who say that they work for pay, is mostly in agriculture.

	[1]	[2]	[3]	[4]	[5]
State = Bihar	0.053**	0.064***	0.072***	0.047**	0.060**
	-0.023	-0.023	-0.024	-0.024	-0.028
Received cycle from Govt		-0.104***	-0.074***	-0.032*	-0.042**
		-0.018	-0.019	-0.019	-0.021
Cycle*female*Bihar			-0.058	-0.024	-0.015
			-0.035	-0.036	-0.037
State = Jharkhand					0.028
					-0.025
Completed school (ssc)				-0.031*	-0.022
				-0.019	-0.02
Age				0.011***	0.011***
				-0.001	-0.001
General Caste				-0.101***	-0.099***
				-0.021	-0.021
OBC Caste				-0.049***	-0.051***
				-0.017	-0.018
Muslim				0.022	0.015
				-0.028	-0.03
Total Agricultural land in Acres				-0.010***	-0.010***
				-0.002	-0.002
Number of observations	4,055	4,055	4,055	4,055	4,055
Log-Likelihood	-1,725.43	-1,708.74	-1,707.43	-1,568.59	-1,566.94

Table 7: Working in Agriculture: This question was asked of women only and so the data for this is restricted to women in the sample age group 12-35 years who are currently not studying. Although, the survey asked about all types of works most women who reported working did so in agriculture. So the sample here is restricted to those women who reported working in agriculture.

To explore why we don't see any other type of employment we consider the reasons provided for not working. The two predominant reason given by the girls are that they do not have family permission to work, and next that there is no "suitable" work available. Both of these responses point to a positive aspiration of the women. They want to work and are constrained by either the societal norm that has not changed fast enough, or by supply of enough "good" jobs.

Table 8 focuses on two reasons that are reported for not working. The first two columns use as the binary dependent variable that takes the value of one if a woman who reported not working says she does so because she cannot find "suitable" work. It captures the notion of aspirations, as girls who have got a chance to get educated are now not willing

to work in agriculture and would like to find other work. Their high aspirations lead to postponed fulfillments.

Columns 3 and 4 of table 8 use as the dependent variable the fact that women report not getting permission from home as the reason for not working. This points to a slowly changing social norm. Women are now willing to work outside the house, but the social norm is changing too slowly, constraining more educated women. We see that girls who got cycles from the government of Bihar are more likely to report that they cannot find “suitable” work as the reason for not working, indicating that girls who are willing to work outside the house are severely constrained by the supply of jobs.

Interestingly, we see that not getting a family permission is not changed by having access to cycles. Most likely the results are due to a selection bias. Most of the girls who got cycles also got jobs. they are therefore not part of the sample any more.

## **5.5 Restricted movement and harassment**

The second set of hypothesis that we intend to test relate to the social fabric of the society and how it may have been altered due to introduction of cycles of girls. The notion here is that as girls are seen to be going to school on cycles it gradually become “acceptable” for society to have the girls go out without being accompanied by male members of their families. So as a first cut, we asked all the girls and women in age group 12-35 years if they can go without seeking permission to a set of places and if they need to permission, on being granted permission do they need to be accompanied by someone.

The places we chose are: school (your own or for your children), toilet (if they need to go out), to fetch water, health center, market, beauty parlor, a friends or relatives place in the same village and a friend or relatives place outside the village. We have collected the information from these answers into two definitions of immobility. First, you are completely immobile if you need permission to go to any of these nine places. The second definition is stricter: you are immobile if you need permission to got to all nine places and also need to be accompanied by someone. We have chosen to spell out immobility rather than mobility given the social context.

	Cannot find suitable work		No permission to work	
State=Bihar	-0.131 (0.107)	-0.041 (0.114)	0.354*** (0.095)	0.350*** (0.110)
Cycle	0.409** (0.189)	0.353* (0.194)	-0.153 (0.162)	-0.150 (0.164)
Cycle*Bihar	-0.167 (0.319)	-0.120 (0.321)	-0.087 (0.296)	-0.089 (0.297)
State=Jharkhand		0.183 (0.136)		-0.008 (0.120)
Completed school	0.175 (0.134)	0.239* (0.141)	0.027 (0.097)	0.024 (0.096)
Respondent age	0.011 (0.006)	0.011* (0.007)	-0.017*** (0.006)	-0.017*** (0.006)
Caste (general)	0.399*** (0.139)	0.410*** (0.138)	-0.041 (0.126)	-0.041 (0.126)
Caste(OBC)	0.024 (0.099)	0.011 (0.098)	0.072 (0.081)	0.072 (0.083)
Muslim	0.049 (0.154)	0.000 (0.155)	0.214 (0.153)	0.217 (0.153)
Total Agricultural land in Acres	-0.025* (0.014)	-0.027* (0.014)	0.009 (0.010)	0.009 (0.010)
Number of observations	1,599	1,599	1,599	1,599
Log-Likelihood	-585.56	-584.17	-1,075.84	-1,075.83

Table 8: Reasons for not working: Among the women who report not working, the reasons for not working were asked. Columns 1 and 2 of the table report results using the dependent variable as those women who report being finding suitable work and columns 3 and 4 report the results using as the dependent variable women who report not getting permission as the main reason for not working.

We actually find that most women in the rural areas are living in very restrictive environments and so to define mobility would be problematic, since the lay of the land does not allow the same freedoms as are exercised in urban areas. So, given this context, we believe the change in social norms is coming from the side of breaking away from the strict restrictions towards less monitoring. As the changes continue, we believe in the next decade or so we can be discussing mobility rather than immobility.

Table 9 reports the results for changes in the two types of immobility. The first column has the binary dependent variable that takes the value of 1 if you need permission to go to all nine places (but maybe going alone). The second column uses the stricter definition of immobility where you need permission and need to be accompanied to all nine places. Perhaps one should now expect to find many women with the restrictions we focus on. Yet, 29% of women in our sample are restricted by the first definition and 13.9% by the

	Definition 1	Definition 2	Harassment	Harass on cycle	Definition 1	Definition 1
State=Bihar	-0.081 (0.108)	0.070 (0.114)	0.218** (0.100)	0.103 (0.134)	-0.086 (0.107)	-0.086 (0.108)
Cycle	-0.385*** (0.126)	-0.331** (0.151)	0.074 (0.123)	0.339* (0.176)	-0.388*** (0.126)	-0.391*** (0.126)
Cycle*Bihar	0.242 (0.170)	0.188 (0.192)	0.036 (0.162)	0.177 (0.243)	0.240 (0.170)	0.234 (0.171)
Completed school	0.456*** (0.068)	0.373*** (0.072)	-0.074 (0.109)	0.066 (0.138)	0.457*** (0.068)	0.453*** (0.068)
Respondent age	-0.035*** (0.005)	-0.040*** (0.006)	0.003 (0.007)	0.005 (0.010)	-0.035*** (0.005)	-0.035*** (0.005)
Caste (general)	0.387*** (0.109)	0.274** (0.111)	-0.014 (0.104)	0.197 (0.151)	0.387*** (0.108)	0.370*** (0.108)
Caste(OBC)	0.216*** (0.075)	0.126* (0.073)	0.182** (0.079)	0.356*** (0.119)	0.212*** (0.075)	0.202*** (0.076)
Muslim	-0.087 (0.129)	0.030 (0.120)	0.073 (0.106)	0.219* (0.131)	-0.089 (0.129)	-0.097 (0.129)
Total Agricultural land in Acres	-0.006 (0.009)	0.010 (0.009)	-0.015 (0.011)	0.000 (0.014)	-0.005 (0.009)	-0.007 (0.009)
Harassment					0.150* (0.089)	
Harassment on cycle						0.244* (0.138)
Number of observations	4,093	4,093	4,093	4,055	4,093	4,055
Log-Likelihood	-2,381.97	-1,588.50	-1,047.40	-396.00	-2,380.22	-2,360.40

Table 9: Restriction in movement of women. Sources and Notes. The survey asked all women if they need permission to go to a set of nine places and if they need to be accompanied. The table uses two definitions of immobility. Definition 1 is less restrictive and the variable takes the value 1 if the person needs permission for all places. Definition 2 is the most restrictive and takes the value of 1 if a women needs permission and needs to be accompanied to all nine places.

more extreme second definition.

The results of the table reveal that the cycle program has resulted in women being less restricted using any of the two definitions. Hence, the cycles seem to clearly empower women. Pointing in the same direction we find that girls in Uttar Pradesh are more restricted in their movement outside the house than in Bihar. Girls in Uttar Pradesh, however, have usually better education and our observations go against what is considered the established pattern. Although Uttar Pradesh has had better education indicators for girls, our first social measure of empowerment (restrictions) we see that Bihar is doing better.

The social and physical harassment that girls face when they are outside the house are related to the restrictions on mobility. Harassment is often cited as a reason why families don't allow girls to go out by themselves. In the survey we asked girls if they had heard of any incident of harassment in recently. Although anecdotal evidence suggests that girls

are exposed to some harassments pretty often, few girls in the survey were reporting it. There are more reports in Bihar than in Uttar Pradesh and Jharkhand, but the numbers are low everywhere.

Perhaps the reason is simply that girls are actually not seen outside alone and thus do not face the type of harassment that we ask about. In addition they may not like to report it, even if it happens. Reporting it, they would perhaps not be allowed to go out. Columns 3 and 4 of table 9 report on who is more likely to report harassment. We see no effect of cycles on general reporting of harassment. But we do see a positive effect of cycles on reports of harassment when biking. Further, as we conjectured, since harassment is linked to mobility, we see that women who reported harassment are also the ones more likely to have restrictions on movement.

	Married or not			Age at Marriage			No. of Children		
	Probit [1]	Probit [2]	Probit [3]	OLS [4]	OLS [5]	OLS [6]	OLS [7]	OLS [8]	OLS [9]
Female	0.498***	0.644***	0.685***	-3.032***	-2.723***	-2.724***	0.453***	0.332***	0.337***
	-0.04	-0.063	-0.066	-0.186	-0.193	-0.194	-0.062	-0.056	-0.057
State = Bihar	0.05	0.168	0.460***	0.193	0.422	0.368	0.12	0.105	0.215**
	-0.064	-0.108	-0.122	-0.291	-0.289	-0.309	-0.129	-0.091	-0.104
Received cycle from Govt	-0.244**	0.289**	0.086	1.170***	0.252	0.274	-1.105***	0.196*	0.134
	-0.104	-0.115	-0.12	-0.311	-0.274	-0.275	-0.147	-0.114	-0.113
Female*Bihar	0.214***	0.188*	0.179	-0.054	-0.073	-0.075	0.153	0.072	0.073
	-0.072	-0.107	-0.11	-0.264	-0.265	-0.266	-0.122	-0.09	-0.09
Cycle*female*Bihar	-0.712***	-0.624***	-0.436***	0.713	0.495	0.475	-0.705***	-0.541***	-0.487***
	-0.137	-0.166	-0.168	-0.439	-0.428	-0.427	-0.205	-0.171	-0.171
State = Jharkhand			0.593***			-0.105			0.215***
			-0.097			-0.224			-0.077
Completed school (ssc)		-0.446***	-0.292***		2.186***	2.154***		-0.531***	-0.468***
		-0.075	-0.073		-0.25	-0.254		-0.065	-0.067
Age		0.282***	0.285***		-0.077***	-0.078***		0.164***	0.166***
		-0.012	-0.012		-0.012	-0.012		-0.006	-0.006
General Caste		-0.375***	-0.349***		0.691***	0.683***		-0.514***	-0.497***
		-0.112	-0.114		-0.203	-0.204		-0.095	-0.096
OBC Caste		0.064	0.019		0.238	0.247		-0.235***	-0.254***
		-0.062	-0.06		-0.154	-0.152		-0.066	-0.066
Muslim		-0.126	-0.253*		-0.017	0.007		0.438***	0.383***
		-0.131	-0.137		-0.252	-0.26		-0.09	-0.095
Total Agricultural land in Acres		0.014*	0.006		-0.045**	-0.044**		-0.007	-0.009
		-0.008	-0.008		-0.02	-0.02		-0.006	-0.006
Number of observations	6,888	6,888	6,888	2,302	2,302	2,302	2,059	2,059	2,059
Log-Likelihood	-4,287.33	-1,532.70	-1,497.02	-5,822.79	-5,701.91	-5,701.71	-3,530.55	-2,988.18	-2,982.21

Table 10: Marriage and child bearing decisions.Sources and notes: The first three pertain to all women above the age of 18 and the next six are restricted to married women.

## 5.6 Marriage decisions

The last aspect that we look at is whether girls are able to exercise their say in their marriage choices. We test this using two indicators. First we test the age at marriage and secondly we look at the number of children they have currently. These are important decisions in the life of the girls and boys in rural areas, where marriage decisions are not always taken independently of family. In fact in most cases it is the family that makes the decision with or without consulting the bride or the groom.

Table 10 shows that girls who had access to cycles are delaying marriage and decisions to have children. Girls who had access to the cycle program are less likely to be married at the same early moment when girls without cycles. marry. Further girls with cycles are likely to delay their marriage and currently have less children. The fact that they have less children now implies they delay the start of their reproductive cycle, but we can not tell if they will eventually have less children since they are still of reproductive age.

## 6 Conclusion

We have explored how an in-kind transfer program - the cycle program of Bihar - can increase girls' aspiration with clear implications for schooling, work and life choices, including marriage and child bearing. The program seems to change both the girls own aspirations and those of their families. The attitudes towards girls in the treated villages seem to have changed as an indirect effect of the intervention. In the longer run the program may change labor force participation.

The cycle program seems to be able to change attitudes towards education, as is evident from the increased completion of school rates, while the much lower success in the completion of college may be indicative of bottlenecks – the insufficient supply of college education in the area, rather than of the disinclination towards letting girls study further.

Our results suggest that girls with cycles would like to find work outside of agriculture, but face family resistance to do so, and also find it hard to get such jobs if they try. This again points to other policies that can supplement the work done by the mukhyamantri

cycle yojana. Clearly the cycles have empowered the girls. Yet, they lack further means and opportunities to become even more independent. This may require increased efforts by the state and others towards job creation.



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