CYCLING TO SCHOOL: INCREASING SECONDARY SCHOOL ENROLLMENT FOR GIRLS IN INDIA

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Increasing female school attainment is one of the MDG’s

Improving female education directly contributes to the ‘inclusive growth’ agenda of the Government

- Growth – by increasing human capital of the labor force
- Inclusive – by allowing more people to participate in the growth process

Large gender gaps in India (and especially in Bihar) in school attendance (grows with age)

Primary schools now exist within 1km of most villages

But distance is still an important barrier to secondary school attendance (again, more so for girls)
School Enrollment by Age & Gender

Panel A: Enrollment in School by Age

India

Bihar
Enrollment of 14-15 year olds in Secondary School by Distance & Gender

Panel B: Enrollment in Secondary School of 14 and 15 Year Olds by Distance
In 2006, GoB initiated a program to provide bicycles to all girls studying in classes 9 and 10
- Personal initiative of the Chief Minister
- Program was called the “Mukhyamantri Balika Cycle Yojana (MBCY)”
- An allocation of Rs. 2000/student was made (now Rs. 2500)
- No direct provision of bicycles – cash was made available to eligible students through the schools, and receipts for purchase of cycles were collected
- This was effectively a CCT (or CKT) program and was India’s first scaled up CT program for girl’s secondary education
  - High-profile program, politically very visible (and also copied)
  - Concerns include fake enrolments, and leakage of funds
  - What was the impact of the program?
Aims to:
- Evaluate impact on secondary school enrolment for girls
- Examine the mechanism of impact (conditionality vs. cycle)

Main challenge for the empirical analysis is that the program was implemented state-wide and so it is difficult to find a control group
- Boys (double difference)
- Jharkhand (triple difference)

If the impact was because of the cycle itself, we should see differential impacts by distance to school
- Quadruple difference (by distance)
- Plot triple-difference by distance (non-parametric)
We use the 2008 District-Level Health survey (DLHS)
- Representative sample of ~1,000 HH/district (total sample of close to 50,000 HH across Bihar/Jharkhand)
- Family roster with education histories
- Village data includes distance to nearest secondary school

Survey conducted ~1.5 years after MBCY launched
- So we treat 14-15 year olds as ‘treated’ cohorts and 16-17 year olds as ‘control’ cohorts
- Dependent Variable: Enrolled in or completed class 9
- 14-15 vs. 16-17 year old girls (first difference)
- Compare with corresponding difference for boys (second difference)
- Compare double difference across Bihar & Jharkhand (triple difference)

But mechanism could be the ‘conditionality’ or the ‘cycle’ or other factors as well (other programs; changes in returns to education for girls in BH)
- If the channel of impact is that the cycle reduces the ‘distance cost’ of attending school, then we should see a larger impact in villages where the nearest secondary school is further away (data lets us test this)
## Results (Double Difference)

### Difference in Differences Estimate for the Impact of Cycle Program on Girl's Enrollment  
(Comparing Changes in Enrollment for Girls and Boys in Bihar alone)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat *Female dummy</td>
<td>0.123***</td>
<td>0.114***</td>
<td>0.0908***</td>
<td>0.0904***</td>
</tr>
<tr>
<td></td>
<td>(0.0149)</td>
<td>(0.0144)</td>
<td>(0.0135)</td>
<td>(0.0134)</td>
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<tr>
<td>Treat</td>
<td>-0.192***</td>
<td>-0.184***</td>
<td>-0.167***</td>
<td>-0.166***</td>
</tr>
<tr>
<td></td>
<td>(0.0108)</td>
<td>(0.0106)</td>
<td>(0.00992)</td>
<td>(0.00992)</td>
</tr>
<tr>
<td>Female dummy</td>
<td>-0.186***</td>
<td>-0.178***</td>
<td>-0.168***</td>
<td>-0.167***</td>
</tr>
<tr>
<td></td>
<td>(0.0117)</td>
<td>(0.0112)</td>
<td>(0.0103)</td>
<td>(0.0103)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.475***</td>
<td>0.823***</td>
<td>0.487***</td>
<td>0.502***</td>
</tr>
<tr>
<td></td>
<td>(0.00980)</td>
<td>(0.0831)</td>
<td>(0.0622)</td>
<td>(0.0673)</td>
</tr>
</tbody>
</table>

Demographic Controls      NO         YES        YES        YES
Household Asset & Literacy Controls NO         NO        YES        YES
Village-Level Controls     NO         NO        NO         YES

Observations              18,453 18,453 18,353 18,331
R-squared                 0.038   0.106   0.225   0.227
### Results (Triple Difference)

#### Triple Difference Estimate for the Impact of Cycle Program on Girl's Enrollment (Comparing the Double Difference between Bihar and Jharkhand)

<table>
<thead>
<tr>
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<th>(1)</th>
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<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat<em>Female dummy</em>Bihar dummy</td>
<td>0.103*** (0.0302)</td>
<td>0.0912*** (0.0294)</td>
<td>0.0525** (0.0252)</td>
<td>0.0523** (0.0253)</td>
</tr>
<tr>
<td>Treat*Female dummy</td>
<td>0.0195 (0.0263)</td>
<td>0.0235 (0.0256)</td>
<td>0.0380* (0.0214)</td>
<td>0.0381* (0.0215)</td>
</tr>
<tr>
<td>Treat*Bihar dummy</td>
<td>-0.0437** (0.0179)</td>
<td>-0.0418** (0.0177)</td>
<td>-0.0290* (0.0160)</td>
<td>-0.0281* (0.0161)</td>
</tr>
<tr>
<td>Female dummy*Bihar dummy</td>
<td>-0.0942*** (0.0233)</td>
<td>-0.0905*** (0.0226)</td>
<td>-0.0686*** (0.0200)</td>
<td>-0.0673*** (0.0201)</td>
</tr>
<tr>
<td>Treat</td>
<td>-0.148*** (0.0143)</td>
<td>-0.143*** (0.0142)</td>
<td>-0.138*** (0.0127)</td>
<td>-0.138*** (0.0127)</td>
</tr>
<tr>
<td>Female dummy</td>
<td>-0.0915*** (0.0202)</td>
<td>-0.0880*** (0.0196)</td>
<td>-0.0986*** (0.0172)</td>
<td>-0.0994*** (0.0172)</td>
</tr>
<tr>
<td>Bihar dummy</td>
<td>0.0115 (0.0163)</td>
<td>-0.0437*** (0.0165)</td>
<td>-0.0247* (0.0146)</td>
<td>-0.0378** (0.0148)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.464*** (0.0130)</td>
<td>0.771*** (0.0240)</td>
<td>0.503*** (0.0240)</td>
<td>0.463*** (0.0393)</td>
</tr>
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</table>

Demographic Controls                  NO          YES          YES          YES
Household Asset & Literacy Controls   NO          NO           YES          YES
Village-Level Controls                NO          NO           NO           YES

Observations                          30,295      30,295       30,147       30,112
R-squared                              0.035       0.088        0.208        0.210
Sketch of Mechanism of Impact

Cost/Benefit

Cost (Pre-Program)

Cost (Post-Program)

Benefit

Distance
Figure 2: Distribution of Villages by Distance to Secondary School

- Bihar
  - Population Weighted

- Jharkhand
  - Population Weighted
## Quadruple Difference

### Mechanism of Impact - Quadruple Difference

(Triple Difference broken down into cases where distance to secondary school was greater than 3km versus less than 3km)

<table>
<thead>
<tr>
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<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat<em>Female dummy</em>Bihar dummy*SS is Far</td>
<td>0.0940</td>
<td>0.0875</td>
<td>0.0898*</td>
<td>0.0882*</td>
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<td>(0.0578)</td>
<td>(0.0560)</td>
<td>(0.0503)</td>
<td>(0.0502)</td>
</tr>
<tr>
<td>Treat<em>Female dummy</em>Long distance</td>
<td>-0.0788</td>
<td>-0.0803*</td>
<td>-0.0745*</td>
<td>-0.0733*</td>
</tr>
<tr>
<td></td>
<td>(0.0496)</td>
<td>(0.0480)</td>
<td>(0.0427)</td>
<td>(0.0426)</td>
</tr>
<tr>
<td>Treat<em>Female dummy</em>Bihar</td>
<td>0.0426</td>
<td>0.0338</td>
<td>-0.00504</td>
<td>-0.00420</td>
</tr>
<tr>
<td></td>
<td>(0.0410)</td>
<td>(0.0394)</td>
<td>(0.0376)</td>
<td>(0.0376)</td>
</tr>
<tr>
<td>Demographic Controls</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Household Asset &amp; Literacy Controls</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Village-Level Controls</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>30295</td>
<td>30295</td>
<td>30147</td>
<td>30112</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.039</td>
<td>0.091</td>
<td>0.209</td>
<td>0.210</td>
</tr>
</tbody>
</table>
Double Difference by Distance

Bihar

Distance to Secondary School

Jharkhand
Triple Difference by Distance
Cycle Ownership

- In looking at mechanisms, we may care about whether the ‘treated’ HH actually received the bicycle!

- Asset questions in DLHS include bicycle ownership
  - But it does not have ‘number’ of cycles (hence low-powered)
  - So the triple difference is positive but not significant

- But we compare bike ownership between HH with 14-15 year old girls in school and those with 14-15 year old girls who are not in school and see that the former HH are 20 percentage points more likely to own a bicycle
# Learning Outcomes

## Impact of Program on Enrollment and Learning Outcomes (Using Pratham ASER 2008 Data)

<table>
<thead>
<tr>
<th>(1) Enrollment</th>
<th>(2) 2 Digit Subtraction</th>
<th>(3) Division</th>
<th>(4) Read Std 1-level text</th>
<th>(5) Read Std 2-level text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat<em>Female dummy</em>Bihar dummy</td>
<td>0.0600 (0.0616)</td>
<td>0.0411 (0.0413)</td>
<td>-0.00771 (0.0536)</td>
<td>0.0478 (0.0349)</td>
</tr>
</tbody>
</table>

Demographic Controls: YES
Household Asset & Literacy Controls: YES
Village-Level Controls: YES

Observations: 8598
R-squared: 0.100

Treatment group = Age 14 and 15
Control group = Age 16

- No measured impact, but the data is under-powered (both in terms of sample size and range of test questions)
Conclusions and Policy Implications

- Estimates of the impact of the MBCY suggest that it increased girls enrollment in secondary schools by 5 percentage points
  - On a base of ~25%, this is a 20% increase in enrollment
  - The policy also reduced the gender gap in enrollment by ~25%

- We find that the program had a greater impact for girls who lived further away from a secondary school, suggesting that a key mechanism for program impact was the reduction in the ‘distance cost’ of school attendance for girls due to the cycle

- Program was at least as cost effective as other comparable ones

- Implications for cash vs. kind transfers – kind may work well when:
  - There is a direct reduction in the marginal cost of schooling
  - The in-kind item is NOT infra-marginal to household spending