

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

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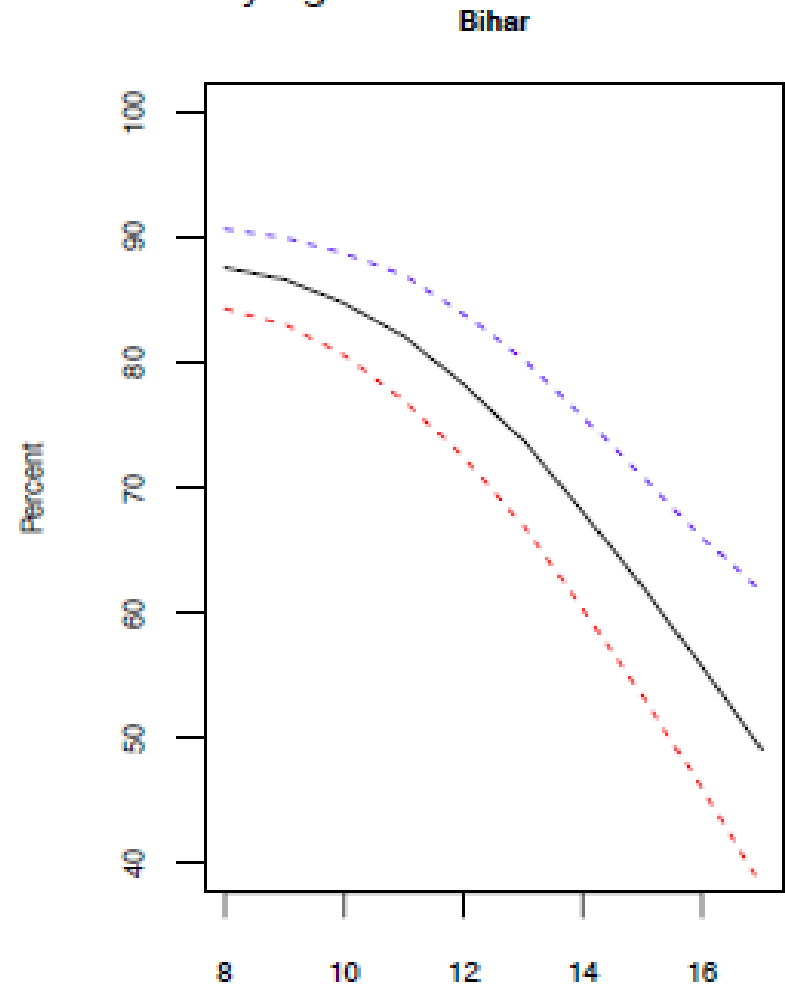
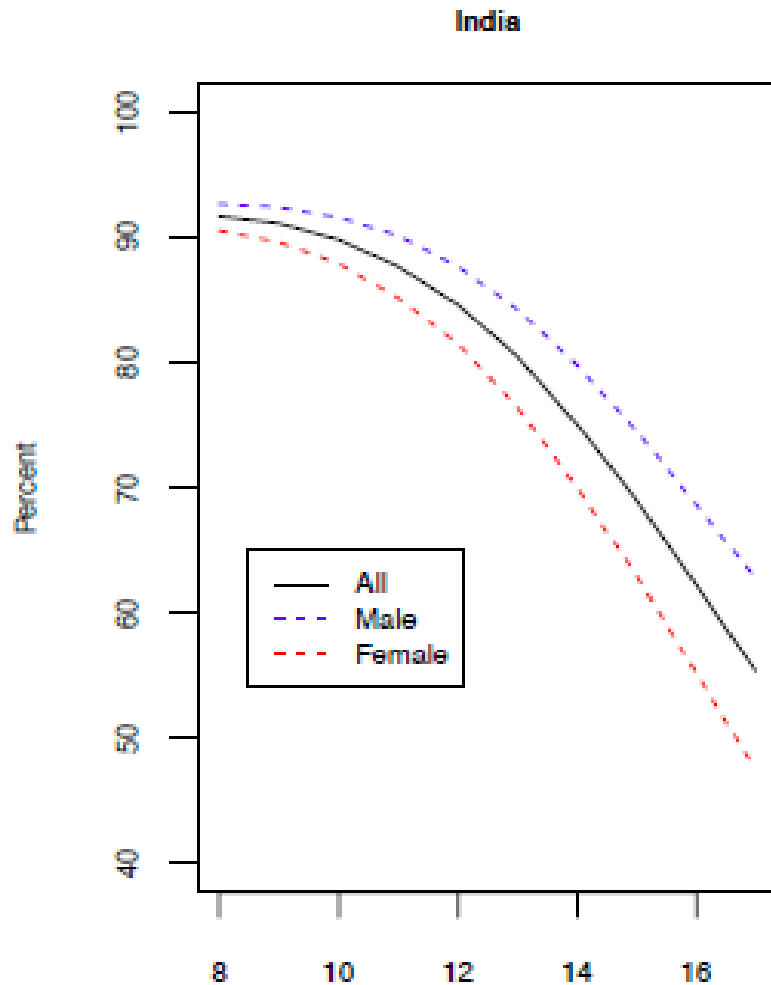
(University of Connecticut, IZA, CReAM)

# Background/Motivation

- 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 1 km of most villages
- But distance is still an important barrier to secondary school attendance (again, more so for girls)

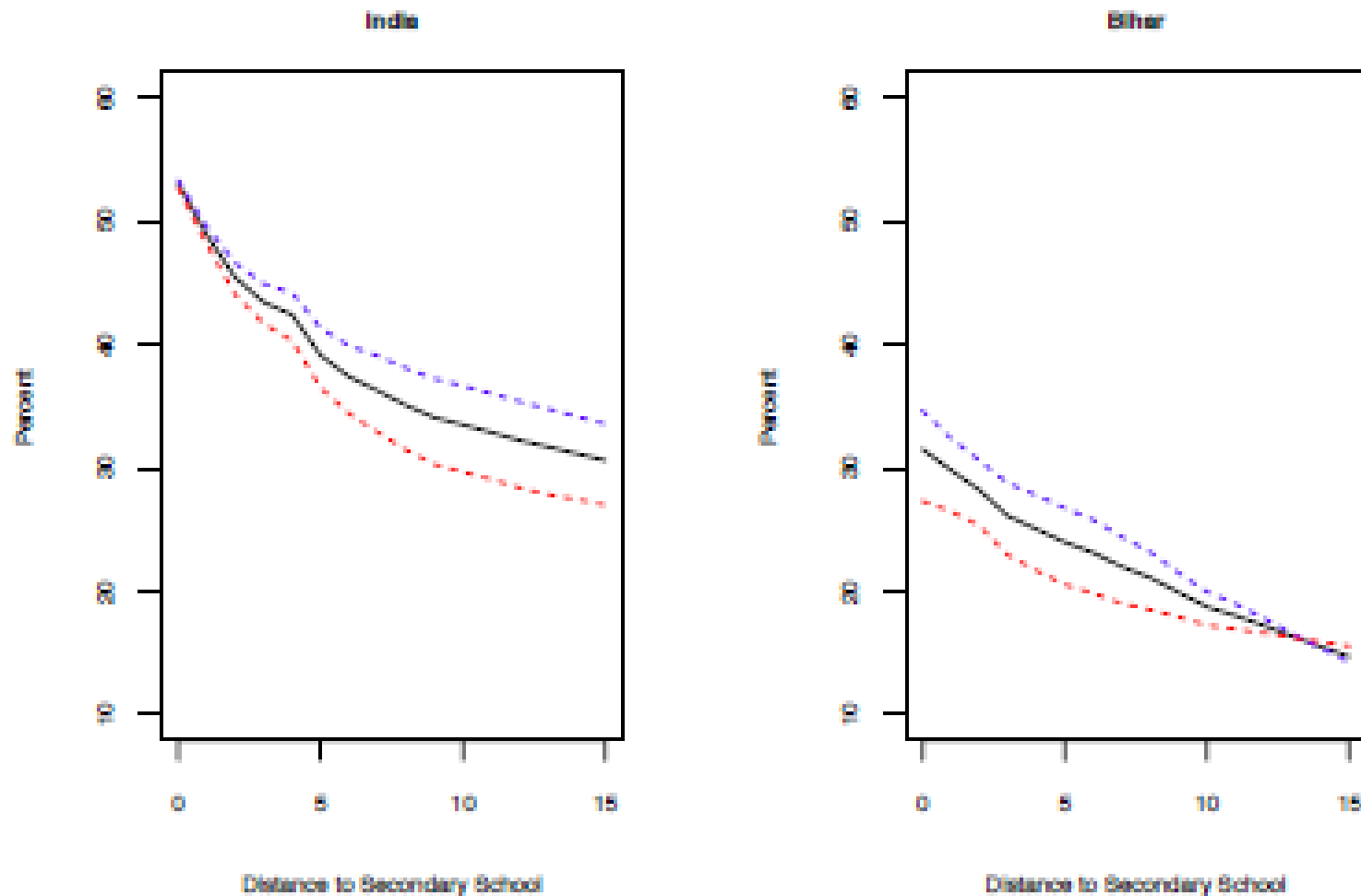
# School Enrollment by Age & Gender

Panel A: Enrollment in School by Age



# 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



# Policy Intervention

- 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?



Picture Credits: Abhinav Nayar

# This Paper

- 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)

# Data & Estimation Strategy

- 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)

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

	(1)	(2)	(3)	(4)
<b>Treat*Female dummy*Bihar dummy</b>	<b>0.103***</b> <b>(0.0302)</b>	<b>0.0912***</b> <b>(0.0294)</b>	<b>0.0525**</b> <b>(0.0252)</b>	<b>0.0523**</b> <b>(0.0253)</b>
Treat*Female dummy	0.0195 (0.0263)	0.0235 (0.0256)	0.0380* (0.0214)	0.0381* (0.0215)
Treat*Bihar dummy	-0.0437** (0.0179)	-0.0418** (0.0177)	-0.0290* (0.0160)	-0.0281* (0.0161)
Female dummy*Bihar dummy	-0.0942*** (0.0233)	-0.0905*** (0.0226)	-0.0686*** (0.0200)	-0.0673*** (0.0201)
Treat	-0.148*** (0.0143)	-0.143*** (0.0142)	-0.138*** (0.0127)	-0.138*** (0.0127)
Female dummy	-0.0915*** (0.0202)	-0.0880*** (0.0196)	-0.0986*** (0.0172)	-0.0994*** (0.0172)
Bihar dummy	0.0115 (0.0163)	-0.0437*** (0.0165)	-0.0247* (0.0146)	-0.0378** (0.0148)
Constant	0.464*** (0.0130)	0.771*** (0.0240)	0.503*** (0.0240)	0.463*** (0.0393)
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

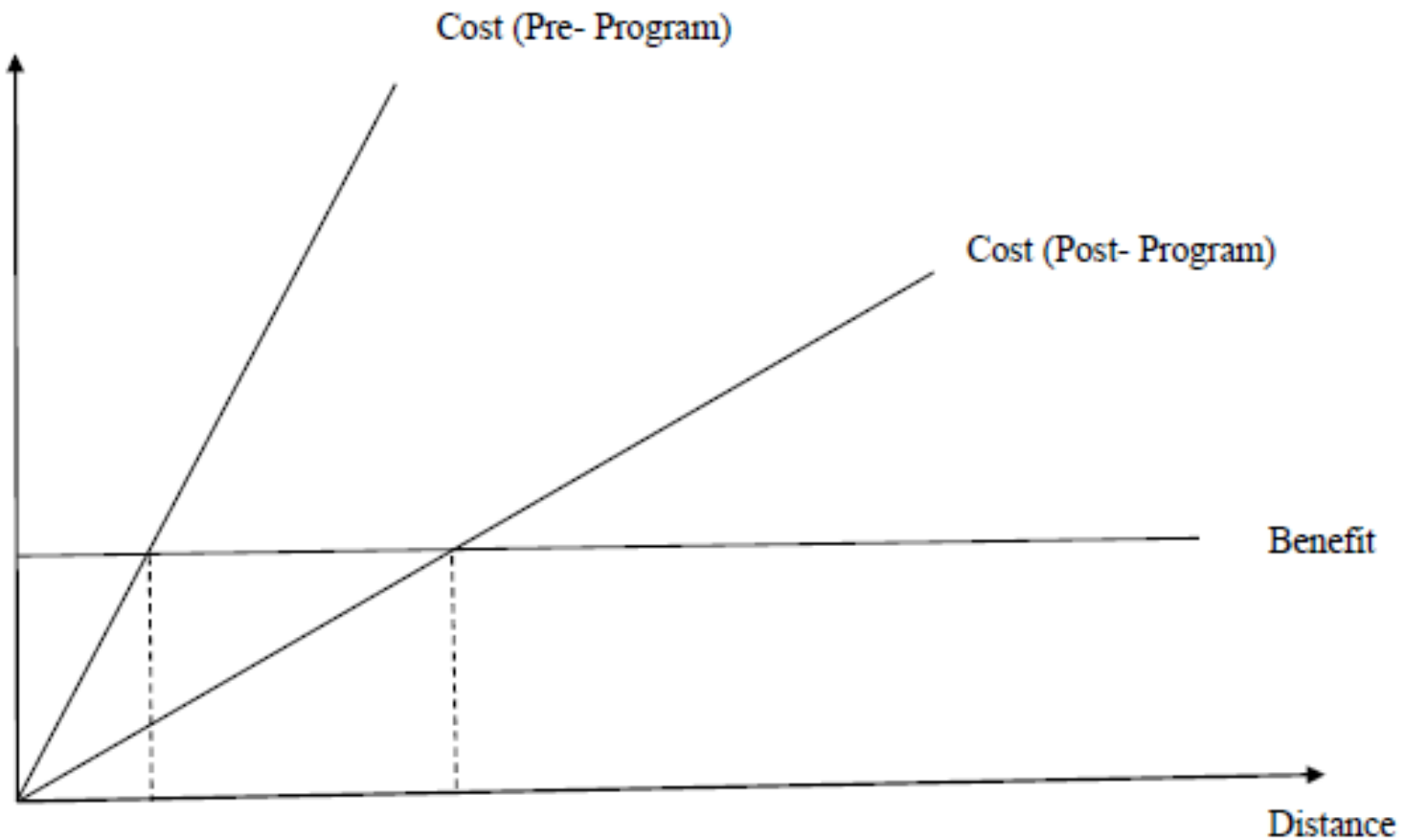
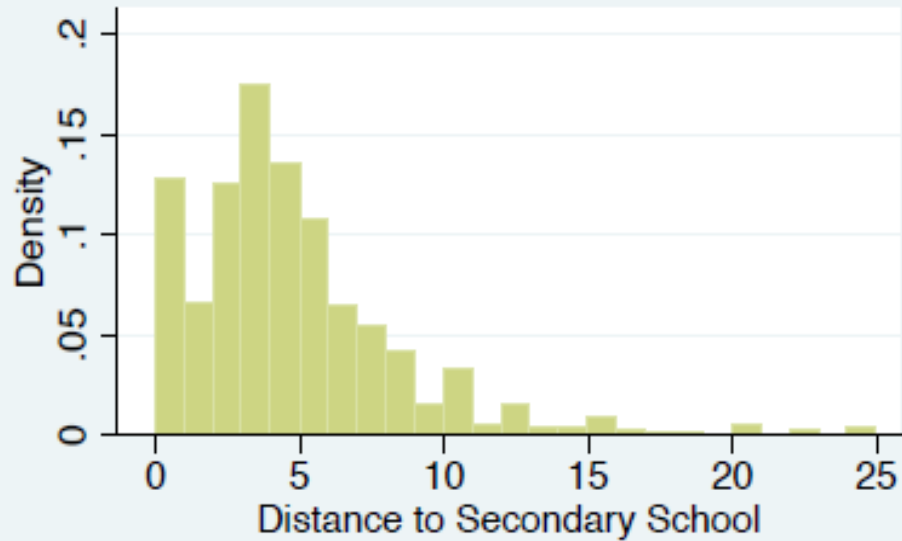


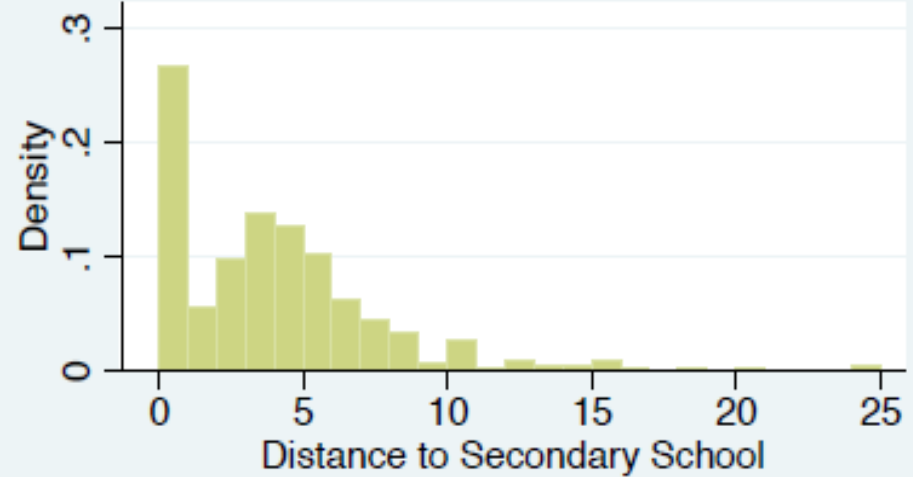
Figure 2: Distribution of Villages by Distance to Secondary School

Bihar

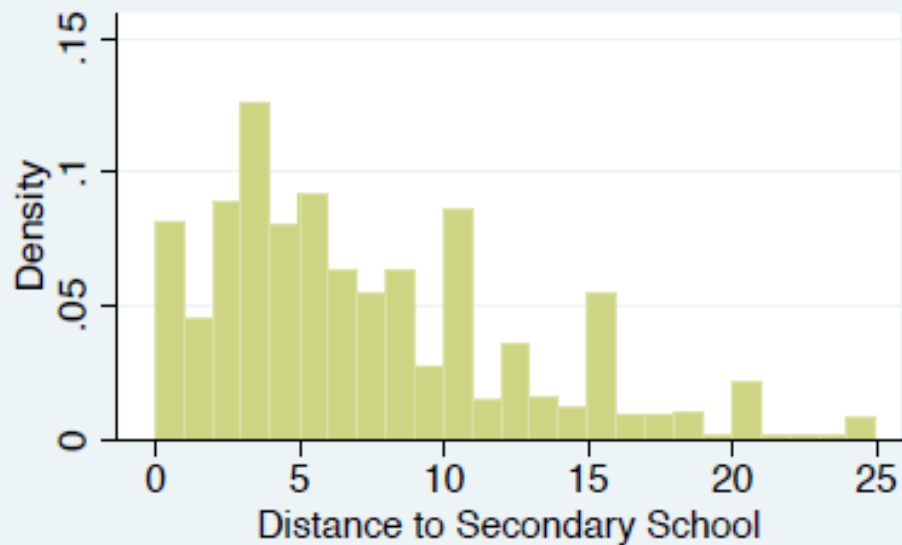


Bihar

Population Weighted

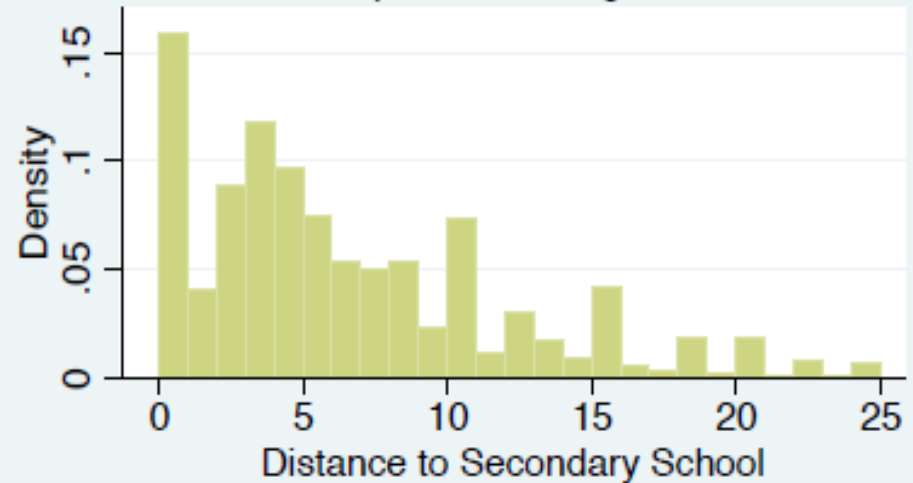


Jharkhand



Jharkhand

Population Weighted

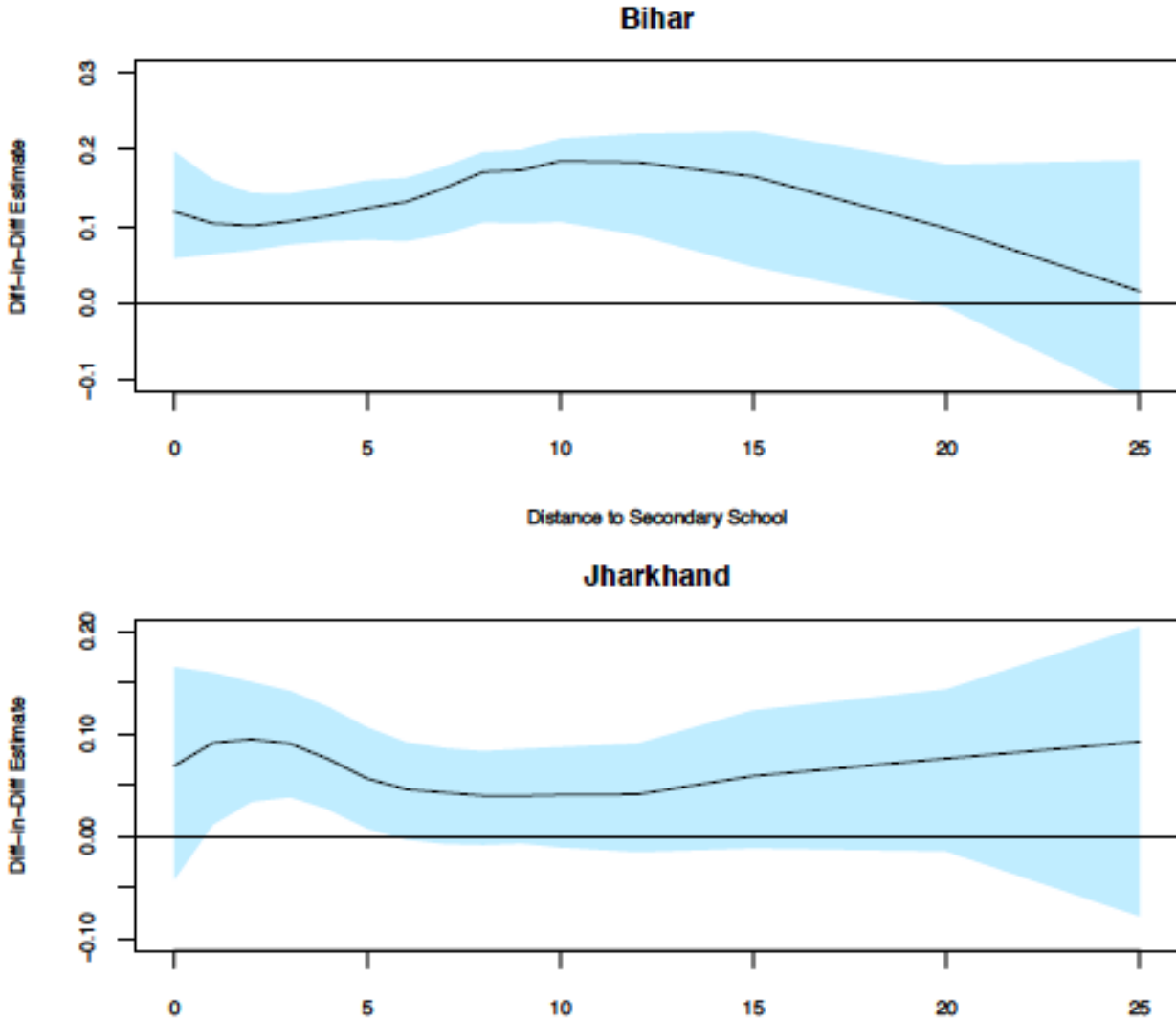


# Quadruple Difference

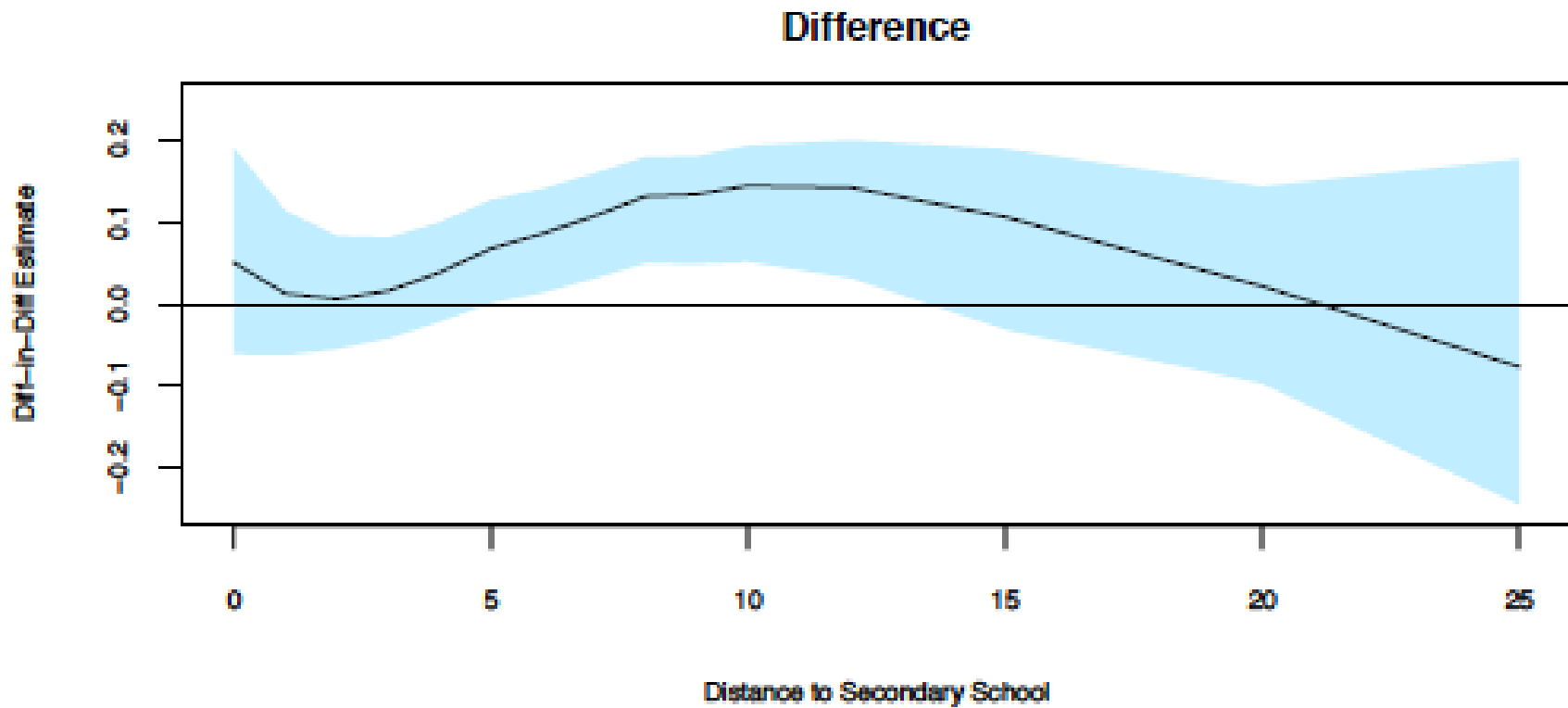
Mechanism of Impact - Quadruple Difference (Triple Difference broken down into cases where distance to secondary school was greater than 3km versus less than 3km)

	(1)	(2)	(3)	(4)
<b>Treat*Female dummy*Bihar dummy*SS is Far</b>	<b>0.0940</b> <b>(0.0578)</b>	<b>0.0875</b> <b>(0.0560)</b>	<b>0.0898*</b> <b>(0.0503)</b>	<b>0.0882*</b> <b>(0.0502)</b>
Treat*Female dummy*Long distance	-0.0788 (0.0496)	-0.0803* (0.0480)	-0.0745* (0.0427)	-0.0733* (0.0426)
Treat*Female dummy*Bihar	0.0426 (0.0410)	0.0338 (0.0394)	-0.00504 (0.0376)	-0.00420 (0.0376)
Demographic Controls	NO	YES	YES	YES
Household Asset & Literacy Controls	NO	NO	YES	YES
Village-Level Controls	NO	NO	NO	YES
Observations	30295	30295	30147	30112
R-squared	0.039	0.091	0.209	0.210

# Double Difference by Distance



# 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)

	(1)	(2)	(3)	(4)	(5)
	Enrollment	2 Digit Subtraction	Division	Read Std 1- level text	Read Std 2- level text
Treat*Female dummy*Bihar dummy	0.0600 (0.0616)	0.0411 (0.0413)	-0.00771 (0.0536)	0.0478 (0.0349)	-0.00634 (0.0502)
Demographic Controls	YES	YES	YES	YES	YES
Household Asset & Literacy Controls	YES	YES	YES	YES	YES
Village-Level Controls	YES	YES	YES	YES	YES
Observations	8598	8598	8598	8598	8598
R-squared	0.100	0.025	0.102	0.019	0.084

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