

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

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Motivation



"Investment in girls' education may well be the highest-return investment available in the developing world."

Lawrence H. Summers

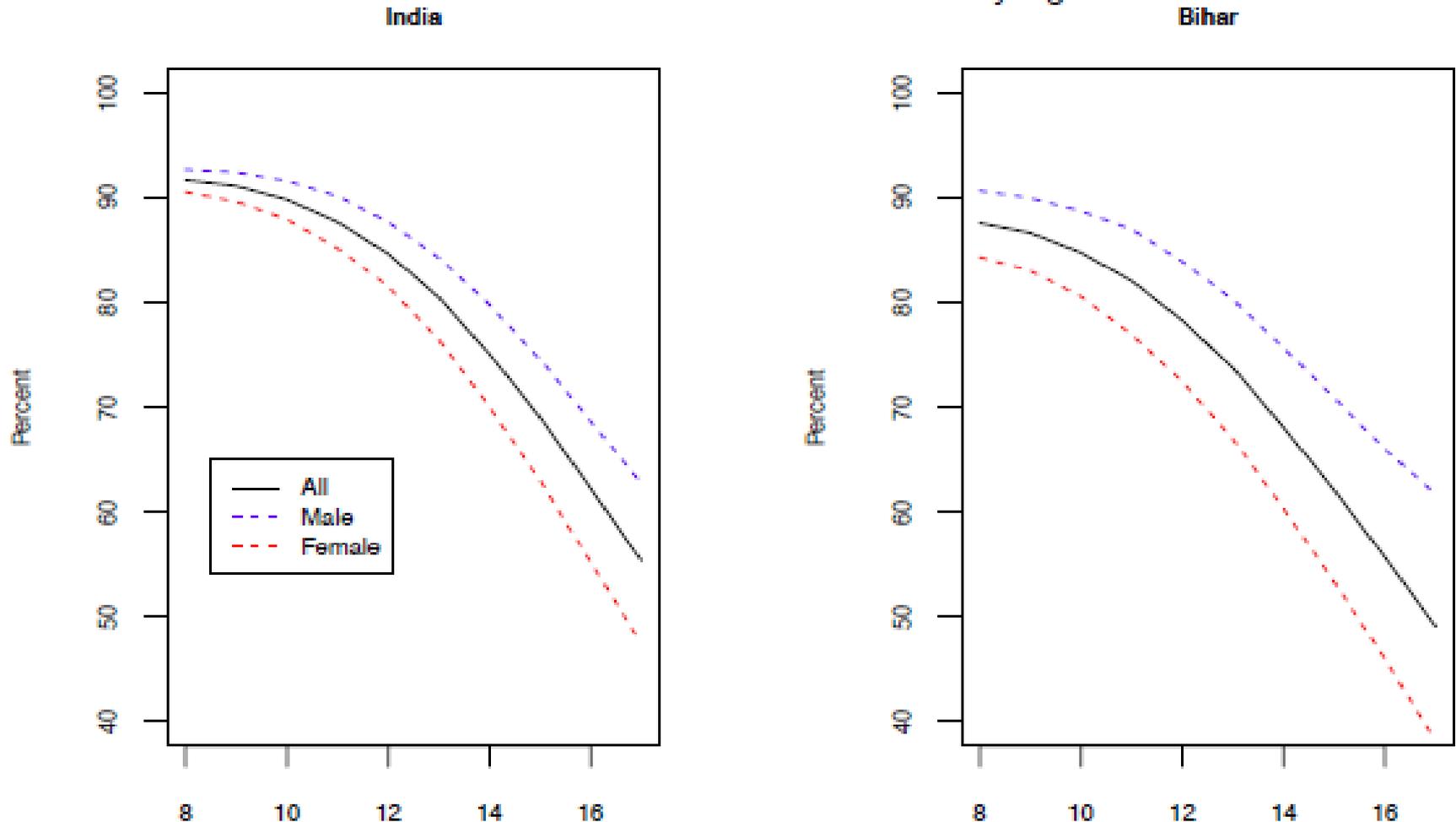
(while Chief Economist of the World Bank)

Background/Motivation

- Increasing female school attainment is one of the MDG's
 - ▣ One of the top priorities for international education policy
- Significant progress at the primary level, but still a major challenge at the secondary level
 - ▣ Steep dropout rates at adolescence/puberty
- Most common policy approaches include:
 - ▣ Demand-side interventions (CCT's, UCT's, FCT's)
 - ▣ Supply-side interventions focus on school construction/access
- Primary schools now exist within 1km of most villages
- But distance is still an important barrier to secondary school attendance (may be especially true for girls)

School Enrollment by Age & Gender

Panel A: Enrollment in School by Age



Policy Context and Intervention

- Bihar is one of India's largest states (pop. > 100M)
 - ▣ Also, one of the most educationally backwards as of 2004
- Govt. of Bihar hoped to boost girls' secondary education by launching an innovative program (in 2006) to provide bicycles to all girls enrolling in secondary school (grade 9)
 - ▣ Grant of Rs. 2000/student (~\$40); now Rs. 2500 (~\$50)
- No direct provision of bicycles – cash provided to eligible students through the schools (in public ceremonies), and receipts for purchase of cycles were collected through schools
- This was effectively a Conditional Kind Transfer (CKT) program and was one of India's first scaled up Conditional Transfer program for girl's secondary education

Salient Features of Program

- Unique hybrid of demand and supply-sided intervention
 - ▣ Enrolment conditionality resembles a traditional CCT
 - ▣ Cycles also improve school access by reducing the distance cost of attendance (also allows economies of scale in school quality)
- High-profile program, politically very visible (and copied)
 - ▣ Several qualitative reports/narratives that the program has been ‘transformative’ and a ‘game changer’; wide pre-election coverage
 - ▣ But no reliable quantitative evaluation of program impact on schooling (lots of reasons to be skeptical of any real impact)
- Potential reasons for non-impact include:
 - ▣ Poor implementation, high corruption, cycles were mainly going to infra-marginal girls, increases driven by growth and other factors

Paper Outline

- Paper aims to estimate impact of the cycle program on secondary school enrolment (and learning outcomes) for girls
 - ▣ Evaluate cost effectiveness and draw lessons for cash vs. kind
- Main challenge for the empirical analysis is that the program was implemented state-wide (no clear control group)
 - ▣ Boys (double difference)
 - ▣ Jharkhand (triple difference) – ideal control state (split from Bihar in 2001)
- But still have to worry about omitted variables
- If the impact was because of the cycle itself, we should see differential impacts by distance to school
 - ▣ Plot triple-difference by distance (non-parametric)
 - ▣ Quadruple difference (triple difference above/below median distance)
- Learning outcomes, robustness, cost effectiveness, and cash vs. kind

Summary of Results

- Program led to a large and significant increase in age-appropriate secondary school participation/completion for girls
 - ▣ Age-appropriate enrollment went by 30% (5.2 pp on base of 17%)
 - ▣ Bridged gender gap in age-appropriate enrollment by 40%
- The effects are completely driven by cases where distance to the nearest secondary school was at/above the median (3km)
 - ▣ 9 percentage points on a base of 12% (~75% in these cases)
- Significant increase in number of girls who attempted the 10th grade SSC exam (but no increase in number who passed)
- Significantly more cost effective than comparable CCT programs
 - ▣ Possible mechanisms include: 'Cycles' were more 'sticky' within HH
 - ▣ Spillovers from coordinated provision of bicycles to girls (safety, social norms)



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MONDAY, APR 1, 2013 07:54 AM PDT

Saudi Arabia lifts ban on women riding bicycles

The new policy stipulates that women must be accompanied by a male guardian and ride "only for entertainment"

BY KATIE MCDONOUGH

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TOPICS: SAUDI ARABIA, WOMEN, WOMEN'S RIGHTS, FEMINISM, LIFE NEWS, NEWS



(Credit: AP)

Women in Saudi Arabia are still banned from driving cars (**among other things**), but the kingdom's religious police are now allowing them to ride motorbikes and bicycles in certain parks and recreational areas. The catch? A male relative or guardian must accompany women riders, according to Saudi news outlet Al-Yawm.

As **reported** by the Associated Press:

The Al-Yawm daily on Monday cited an unnamed official from the powerful religious police as saying women can ride bikes in parks and recreational areas but they have to be accompanied by a male relative and dressed in the full Islamic head-to-toe abaya.

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Data and Estimation Strategy

- We use the 2008 District-Level Health survey (DLHS)
 - Representative sample of ~1,000 HH/district (total sample ~50,000 HH)
 - Family roster with education histories
 - Village data includes distance to nearest secondary school
- Survey conducted ~1.5 years after Cycle Program was launched
 - So we treat 14-15 year olds as 'treated' cohorts and 16-17 year olds as 'control' cohorts (as in Duflo 2001)
 - 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)
 - Compare triple difference by whether a village was above/below median distance to school (quadruple difference)
- We also collect official data on student learning outcomes using appearance/passing on 10th grade board exam
- Also collect official school enrollment data (for testing trends only)

Results (Triple Difference)

Dependent variable: Enrolled in or completed grade 9

Treatment group = Age 14 and 15

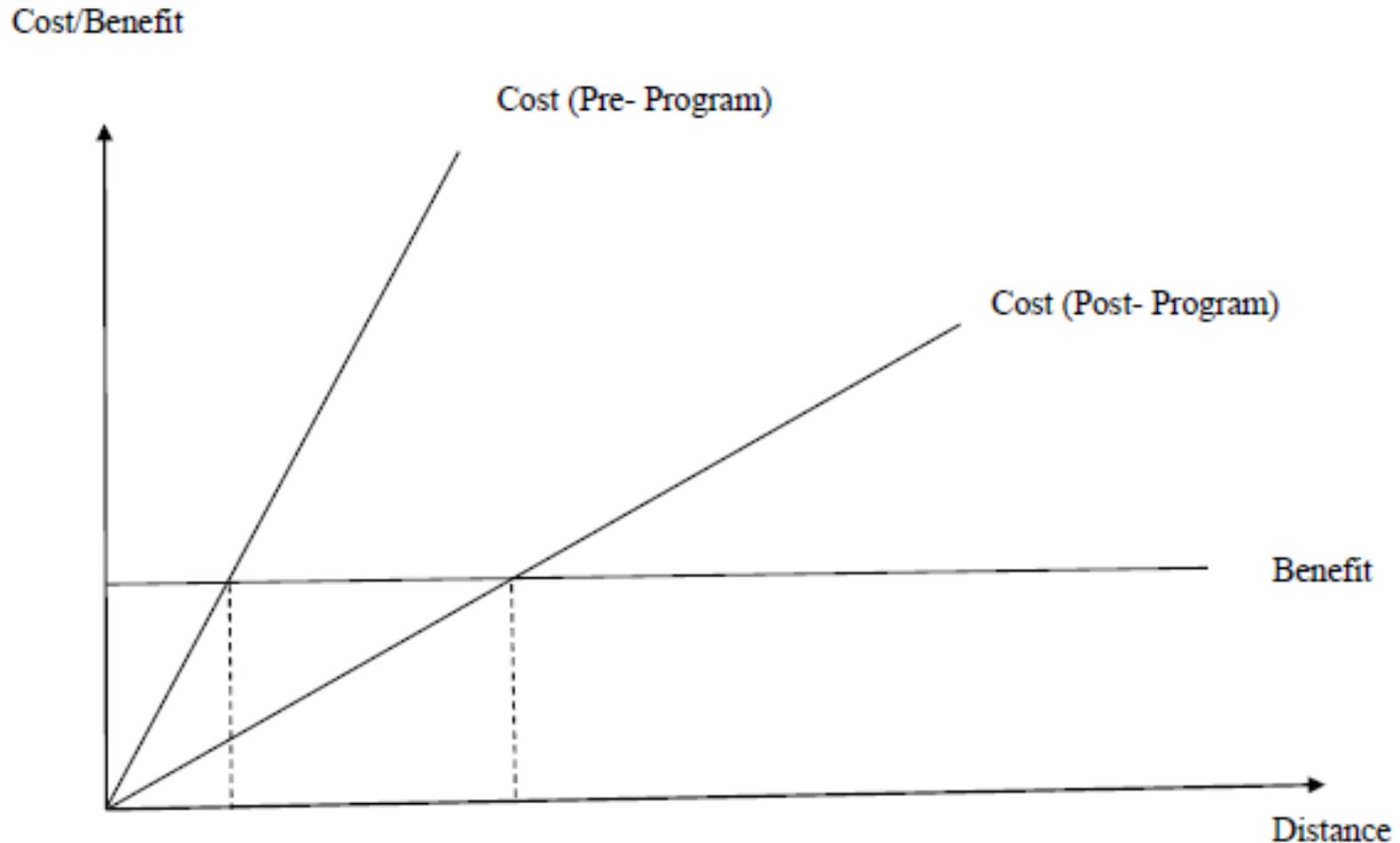
Control group = Age 16 and 17

	(1)	(2)	(3)	(4)
Treat×Female dummy×Bihar dummy	0.103*** (0.0302)	0.0912*** (0.0294)	0.0516** (0.0252)	0.0515** (0.0252)
Treat×Female dummy	0.0195 (0.0263)	0.0235 (0.0256)	0.0385* (0.0214)	0.0385* (0.0214)
Treat×Bihar dummy	-0.0437** (0.0179)	-0.0418** (0.0177)	-0.0287* (0.0160)	-0.0278* (0.0161)
Female dummy×Bihar dummy	-0.0942*** (0.0233)	-0.0905*** (0.0226)	-0.0671*** (0.0199)	-0.0658*** (0.0200)
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)	-0.100*** (0.0170)	-0.101*** (0.0171)
Bihar dummy	0.0115 (0.0163)	-0.0437*** (0.0165)	-0.0324** (0.0145)	-0.0451*** (0.0146)
Constant	0.464*** (0.0130)	0.771*** (0.0240)	0.593*** (0.0266)	0.561*** (0.0396)
Demographic controls	No	Yes	Yes	Yes
HH socio-economic 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	0.207	0.208

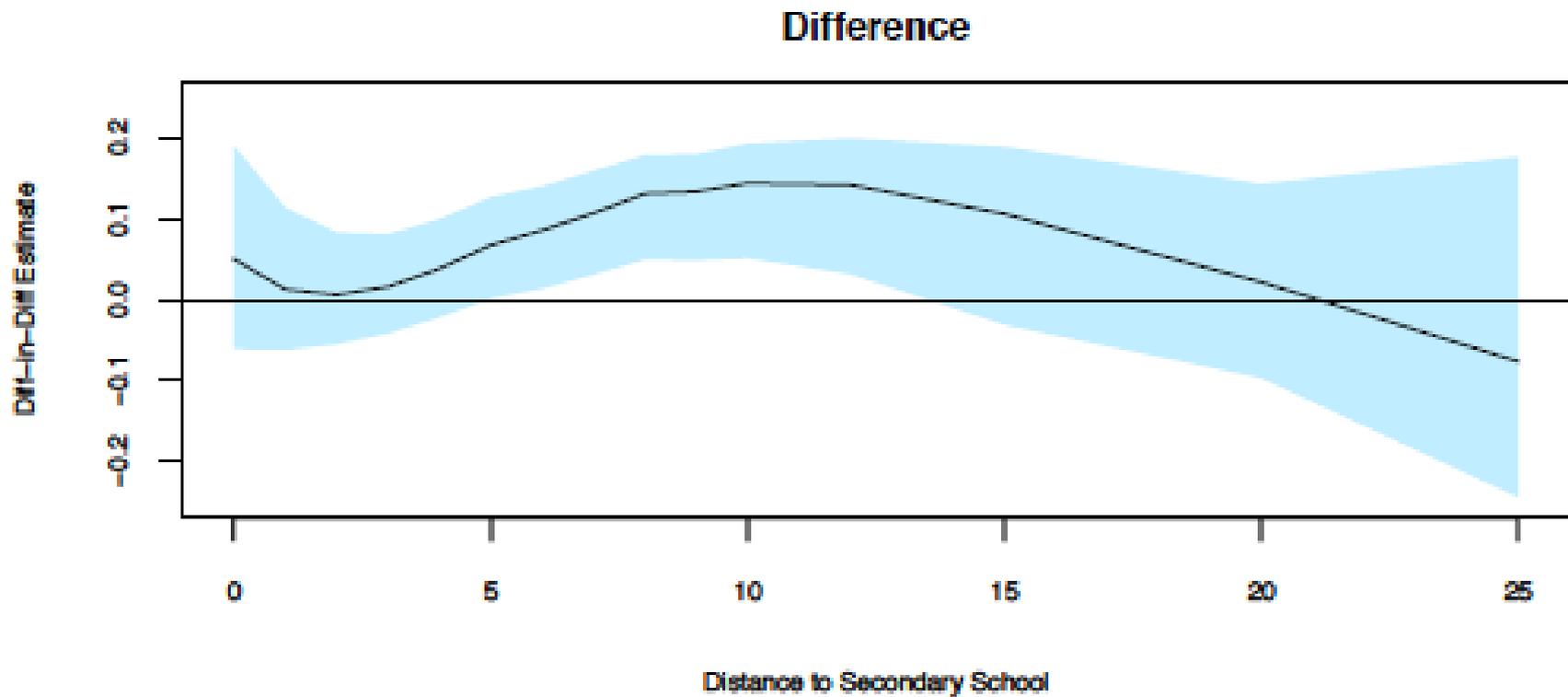
Summary of Results So Far

- Exposure to the Cycle Program increased the age-appropriate secondary school enrollment of girls by 30% (5.2 percentage points on a base of 17%)
- It also reduced the gender gap in age-appropriate secondary school enrollment of girls by 40% (initial gender gap was $\sim 13\%$, with boys having a base enrollment rate of 30%)
 - ▣ No significant heterogeneity by demographic variables
- But there can still be other confounding factors:
 - ▣ Higher growth rates in Bihar (and greater income elasticity of girl's school participation relative to boys)
 - ▣ Differential trends in returns to education for girls in Bihar?

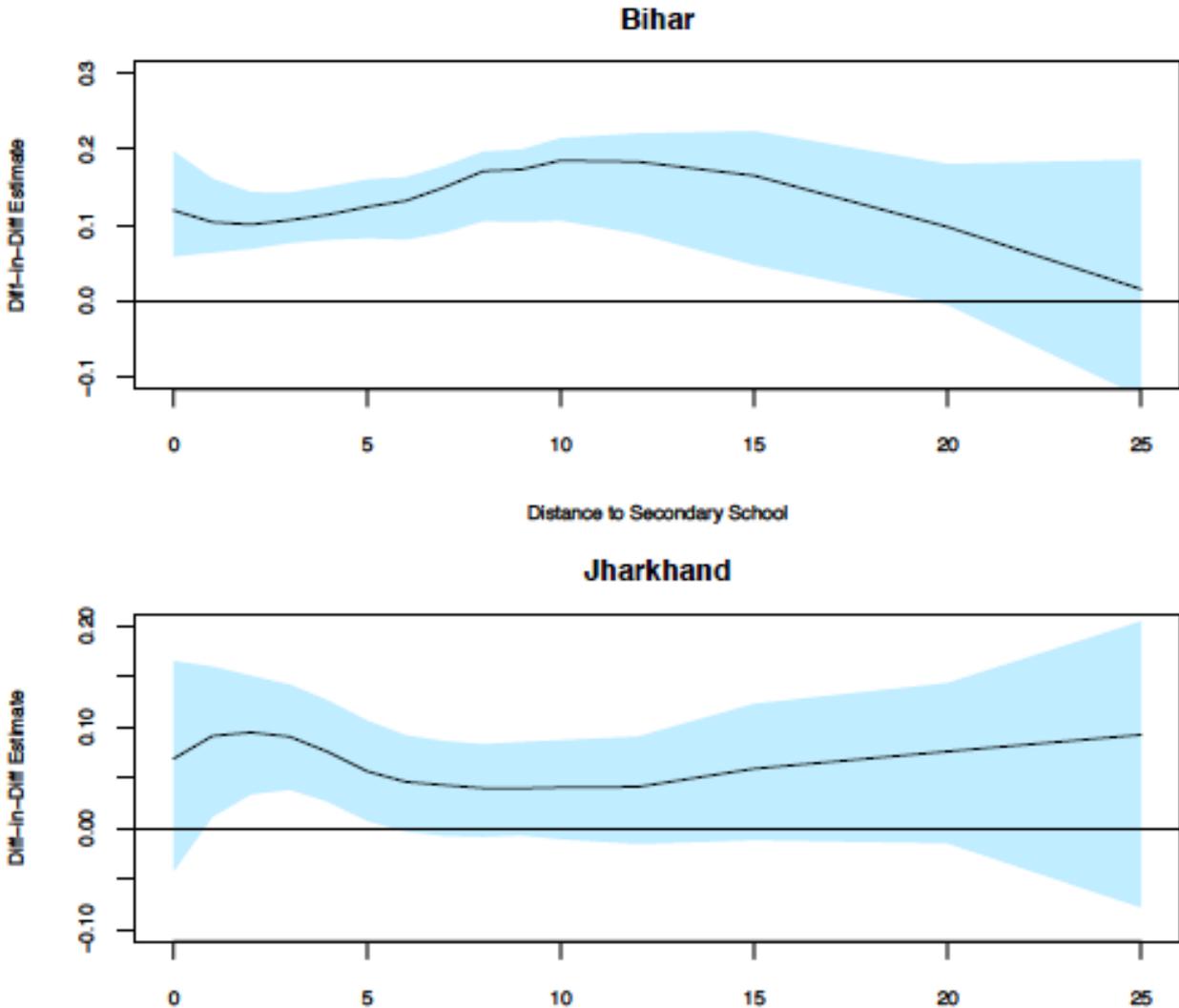
Sketch of Mechanism of Impact



Triple Difference by Distance



Double Difference by Distance



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)
Treat*Female dummy*Bihar dummy*SS is Far	0.0940 (0.0578)	0.0875 (0.0560)	0.0898* (0.0503)	0.0882* (0.0502)
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

Robustness

- Could other factors generate the same pattern that we saw in the previous picture?
 - ▣ Improvements in roads and law and order could also have a differential positive impact on girls **as an increasing function of distance to school**
- So we conduct a placebo test – by looking at the triple-difference estimate of enrollment for 8th standard girls
 - ▣ Just 1 year younger, but not eligible for cycle
 - ▣ We find no differential impact in the 8th standard (also in DDDD)
- Suggests that the cycle program was the key factor for the effects we find and that our results are causal estimates of its impact
 - ▣ Better roads, and improved law and order could be complements
- Also check robustness to using only border districts

More on Mechanisms

- 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
- So we rely on Ghatak, Kumar, and Mitra (2013) to confirm that implementation of the program was remarkably effective and that 97% of eligible beneficiaries received the benefit
- Finally, we look at the stated reasons for drop-out among the older cohorts and find that 7.6% say that it was because of distance/transport
 - ▣ Thus, our estimated treatment effects of a 5.2 percentage point increase in enrollment is in the correct ball park

Academic Outcomes (10th Standard)

Dependent Variable	Log (Number of Candidates who Appeared for the 10th Grade Exam - Observation at the School Level)	Log (Number of Candidates who Passed the 10th Grade Exam - Observation at the School Level)
	(1)	(2)
Panel B: Triple Difference (DDD) Estimate of Exposure to Cycle Program		
Bihar Dummy×Female×Post	0.0946** (0.0399)	0.00103 (0.0449)
Female×Bihar Dummy	-0.230*** (0.0760)	-0.183** (0.0776)
Bihar×Post	0.440*** (0.0510)	0.348*** (0.0527)
Female×Post	0.209*** (0.0320)	0.214*** (0.0334)
Female Dummy	-0.661*** (0.0665)	-0.732*** (0.0681)
Observations	45564	45215
R-squared	0.162	0.144

Cost Effectiveness

- Natural comparison is with the common policy (around the world) of conditional cash transfers to HH to keep girls enrolled in school
- A conditional girls scholarship program (for class 6-8) in Pakistan was found to have a significant positive impact on enrollment (also a triple difference estimate)
 - ▣ Program cost \$3/month and increased enrollment by 9% (4 percentage points on a base of 43%)
- Cycle program cost < \$1/month (assuming cycle lasts 4 years) and increased enrollment by 40% (5.2 pp. on base of 13%)
- Thus the Cycle program both cost considerably less and was more effective (both absolute and especially relative effects)
- These results (contrast with Das et al 2013) make it a good setting to think about when in-kind benefits may be better than cash

Why May the Cycle Have Done Better Than A Conditional Cash Transfer?

- Cycle reduced the daily cost of going to school (unlike cash)
- Cycle was NOT infra-marginal to HH spending (and it was difficult to sell the cycle and monetize it – social stigma, price penalty)
- But if the cycle was the key to helping girls go to school, then presumably a HH could have used a CCT to buy cycles on their own
- May not happen for two reasons:
 - ▣ Credit constraints
 - ▣ Intra-household bargaining
- So, the cycle may help transfer 'stick' to the targeted girl
- A further point is that the coordinated provision of cycles most likely generated positive externalities (safety in groups, social norms)
- Finally, could have contributed to female empowerment (Basu 2006)

Implementation Lessons?

- Why was the Cycle Program Implemented so well (3% leakage) in a setting of historically poor governance (still seen in many sectors in Bihar – such as PDS and ICDS)
- Possible reasons include (based on qualitative field reports, other research, and interviews with officials and head teachers):
 - ▣ Universal eligibility
 - ▣ One-time highly visible transfer as opposed to monthly small transfers:
 - ▣ Distribution in public ceremonies (attended by officials and local leaders)
 - Also provides a visible forum for complaints, and may inhibit resale
 - ▣ Higher end of SES characteristics
 - ▣ Politically visible and rewarding, and had commitment of senior leadership
- All these are relatively straight forward to replicate in other settings

Summary

- Estimates of the impact of the Bihar Cycle Program suggest that it increased girls age-appropriate enrollment in secondary schools by 5 percentage points
 - ▣ On a base of ~17%, this is a 30% increase in enrollment
 - ▣ The policy also reduced the gender gap in enrollment by ~40%
- The program impact was mainly found for girls who lived further away from a secondary school (~9 percentage points)
 - ▣ On a base of ~12%, this was a ~75% increase in enrollment
- Program appears to have been significantly more cost effective than comparable CCT programs in South Asia
- “The Cycle program appears to have been quite unique in its ability to effectively provide a non-fungible transfer to girls that was not captured by either households or officials, and which thereby reduced the daily cost of school attendance for girls”

Implications for Policy and Research

- From a policy perspective, it is worth highlighting that we are not evaluating a small pilot program but a scaled up “as is” program in a state of 100 million people – with historically weak governance (Bold et al. 2013)
- Suggests that this may be a scalable policy for improving school access in many other low-income settings
- But, no impact on learning outcomes (consistent with global CCT literature)
 - ▣ This is the next area for policy/research to focus on
- Good setting to think about cash vs. kind transfers and when latter might do better
 - ▣ When U (Social Planner) \neq U (HH Head); Spillovers; Social norms
- Demonstrates feasibility (especially in development literature) of credible impact evaluation even in settings of universal program implementation
 - ▣ Heterogeneity by distance is similar to approaches in Bleakley (2007), Hornbeck (2010)
 - ▣ Can look for variation in ‘effective impact’ even with universal implementation
 - ▣ Allows credible evaluation of ‘at scale’ programs

Concluding Thoughts

"Investment in girls' education may well be the highest-return investment available in the developing world."

Lawrence H. Summers (former Chief Economist of the World Bank)

"I think the bicycle has done more to emancipate women than anything else in the world."

Susan B. Anthony (19th century leader of US women's suffrage movement)