Access to Technology and Math Proficiency among Students: Empirical Evidence from India

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Objectives

- Digital technologies such as laptops have the potential to improve access to educational resources and provide personalized learning for advancing SDG 4 on ensuring quality education for children.
- However, limited evidence exists on the impacts of these resources on educational outcomes in low- and middle-income countries.
- We study a government programme from India that provided free laptops to students and estimate its impact on foundational math skills of the potential beneficiaries.

Policy Background

- The **Tamil Nadu Free Laptop Scheme (TFLS)** was launched in the state of Tamil Nadu in southern India in September 2011.
- The scheme provided free laptops to students studying in class 12th of government or government aided higher secondary schools.

Data Sources

- We use information from two large scale nationally representative data sources for our analysis:
- **Annual Status of Education Report** (ASER): 2008-2012
- **India Human Development Survey** (IHDS): 2004-05, 2011-12
- We use ASER to study impacts on foundational math skills and English comprehension.
- We use IHDS to study change in education related behavior of students (e.g. time spent on learning, whether students received private (out-of-school tuition)).

Figure 1: Dynamic DDD Estimates (from last pre-treatment year 2010) for the impact of the Tamil Nadu Free Laptop Policy on foundational math skills

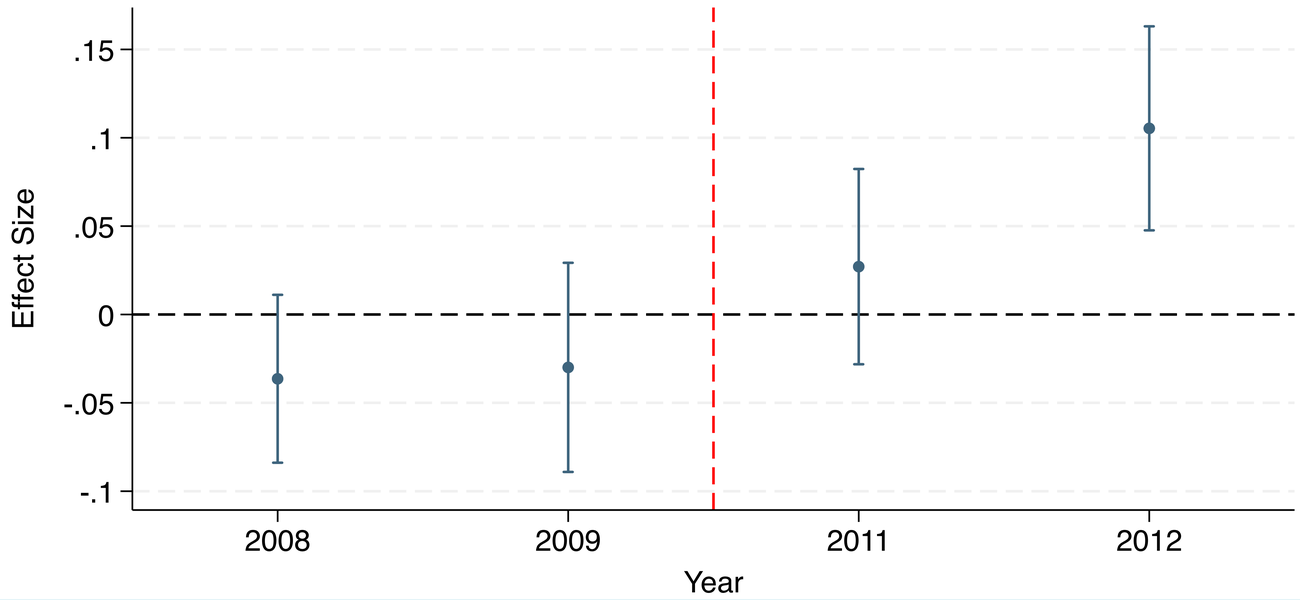
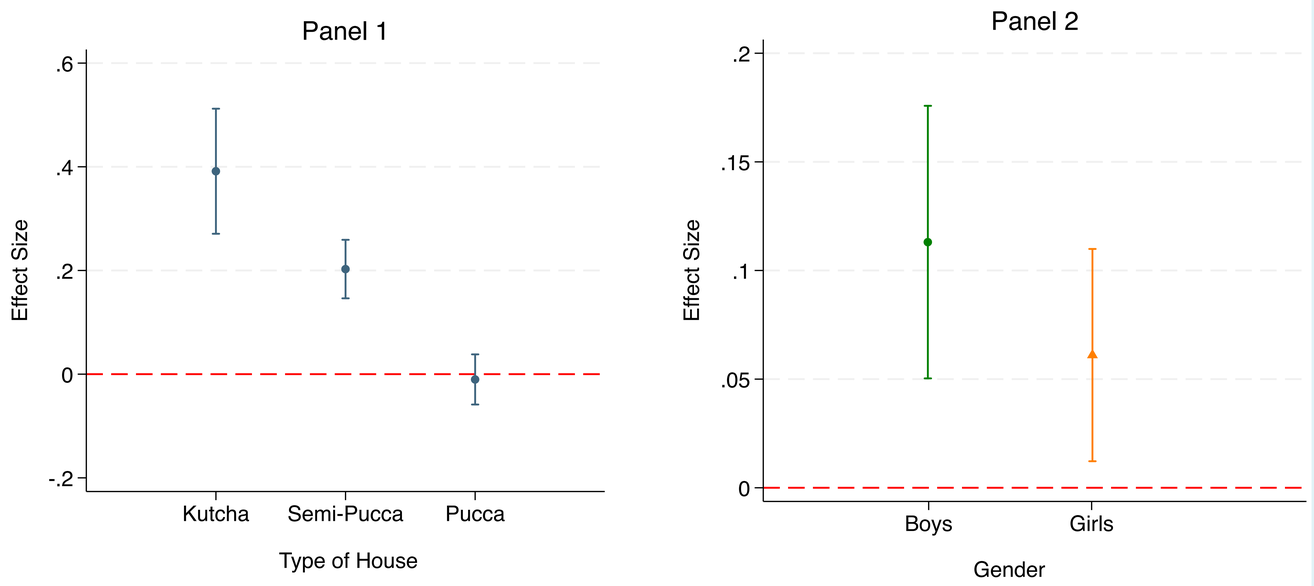


Figure 2: Subsample analysis by Housing Type (Panel 1) and Gender (Panel 2)



Methodology

- We employ a triple difference (DDD) identification strategy to study the impacts of the program using an intent to treat (ITT) analysis design.
- For students studying in government schools, we compare the outcomes of the **eligible cohort (class 12th)** to that of the **ineligible cohort (class 11th)** across the **treated state of Tamil Nadu** and other **control states** in India, **before** and **after** the program. We use the following regression specification:

$$Y_{ihvs} = \alpha_s + \delta_t + \beta_1(E \times T \times P) + \beta_2(E \times T) + \beta_3(T \times P) + \beta_4(E \times P) + \beta_5(E) + \beta_6(T) + \beta_7(P) + \gamma_1.X_i + \gamma_2.X_h + \gamma_3.X_v + \epsilon_{ihvs}$$

- Here, E,T, & P are dummies taking value 1 for eligible cohort, treated state and post period, respectively. β_1 picks up the policy effect.

Findings

- **1.3% - 2.3% positive impact on** foundational math skill scores of students.
- Potential **mechanisms** for this effect include: improved comprehension and understanding of English, more time spent on learning and reduced lower quality private tuition.
- Students from resource constrained background catch up.
- 'Reverse gender gap' in foundational math skills close as boys catch up to girls.

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