Education Policy and Intergenerational Educational Persistence: Evidence from Rural Benin.

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Introduction and Motivation

The Maximally Maintained Inequality hypothesis [Raftery and Hout, 1993]: Negative relationship between

1. privileged class's demand for education, and
2. middle/low class's ability to take advantage of educational opportunities.

The MMI theory accounts for 2 characteristics of the context

a. Intergenerational educational persistence (e.g children with educated parents are more likely to be educated)
b. Privileged class are more prepared to take advantage of new educational opportunities.

Empirical studies have confirm or provide exception to pattern of MMI [Hout, 2006]

This paper tests for a pattern of MMI at primary school level in the context of rural Benin

Research Objective and Questions

The purpose of this paper is to use data from the 2013 Population and Habitation Census in Benin republic (a sample of 10%) to analyze:

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1. How education policy like waive of school fees payment impacts parents' decision to enroll their daughter in school.
2. And how this effect changes across family groups, classifying households based on
   - the Household Wealth Index (HWI), and
   - the education of the head of household,

   2.1 when there is close to saturation in the demand for education among privileged class, and
   2.2 when there is substantial demand for education among privileged class.

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Preview of findings

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1. Households with non-educated head of household uniformly benefit more from the subsidy, when almost all educated parents are educating their children before the policy (76%),
2. We have the opposite when only 27% of them are.

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Using households with sons in rural areas as control, a nonlinear difference in differences estimate shows that

1. Households with non-educated head of household uniformly benefit more from the subsidy, when almost all educated parents are educating their children before the policy (76%),
2. We have the opposite when only 27% of them are.
3. There is no evidence of heterogeneous effect for number of children and gender of the head of the household.
4. Heterogeneity along HWI is ambiguous given that there is no evidence in the first case but in the second case.

Literature Review and Contribution

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1. Evaluation of education programs in developing countries ([Duflo, 2001], [Chen et al., 2013], [Ashraf et al., 2020], [Duflo et al., 2021]).
   - Education programs that decrease the cost of schooling lead to both increase in enrollment rate and adult earning
   - Education programs lead to heterogeneous effect across social groups

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   - Education programs that decrease the cost of schooling lead to both increase in enrollment rate and adult earning
   - Education programs lead to heterogeneous effect across social groups
2. Intergenerational mobility in terms of human capital formation and educational attainment ([Boudon, 1974], [Breen and Goldthorpe, 1997], [Checchi et al., 2008], [Chusseau et al., 2013], [Torche, 2019]).
   - Persistent inequality in college education is due to differences between liquidity constraint and risk aversion of parents with and without college education.
   - Fixed education cost is a sufficient condition for under education trap.
3. Intergenerational educational persistence ([Raftery and Hout, 1993] [Hout, 2006]).

Free Elementary Education in Benin

Elementary education is compulsory (1990) $\longrightarrow$ No tuition payment for girls in rural public elementary schools (2003) $\longrightarrow$ No tuition payment in public elementary schools (2006)

- In this paper, we focus on the 2003 decision concerning girls in rural areas.

Data and Variables

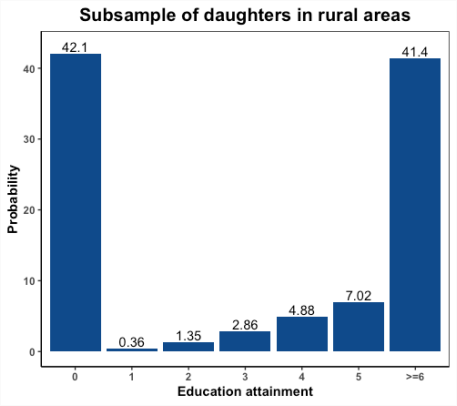
Data and Variables

- The main data used in this paper is from the 2013 Population and Habitation Census in Benin republic. The data is available on IPUMS website.
- I was able to link children to one of their parents in the sample.
- I construct a sample of children and one of their parents— father if the head of household is a man and mother if the head of household is a woman.

Data and Variables

- I also construct a wealth index for each household using Factor components analysis procedure.
- The key variables for parents (Head of the household) include education level, number, gender and ages of children, religion and ethnicity.
- For children, we have identity of one of the parents (mother or father), age, gender, and educational attainment in 2013.

Data and Variables (Cont.)



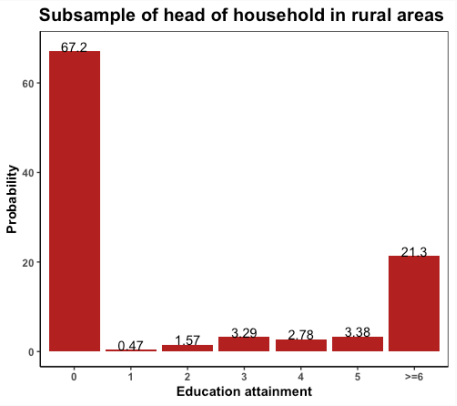


Figure 1: Histograms of primary school education attainment.

1. Low drop out rate in primary school.
2. There is intergenerational educational mobility.

Data and Variables (Cont.)

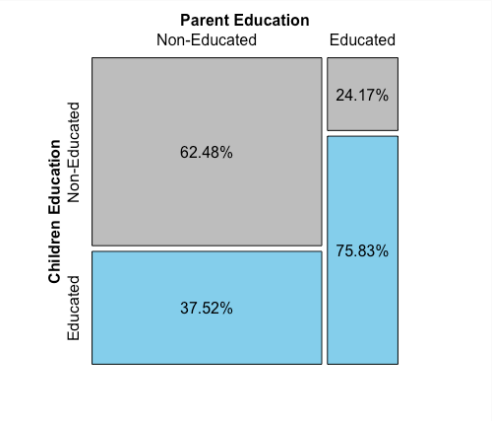


Figure 2: Education of daughters (in rural areas before the policy) and education of head of their households as function of each other. skip slide

1. There is intergenerational educational persistence.
2. Close to saturation among educated parents.

Data and Variables (Cont.)

Pre- and Post- treatment observations

- I consider the household as unit of observation and we have a pseudo panel where households are observed multiple times through their children
- Households with daughters in rural areas constitute our treatment group.
- Children between 13 and 18 years old in 2013 are post treatment observations
- And children between 19 and 28 years old are pre treatment observations

Data and Variables (Cont.)

Treatment and Control Groups

- In term of control group I can either consider:
  1. Households located in rural areas with sons but no daughters in exposed cohorts, or
  2. Households with daughters located in urban areas

Methodology

Methodology and Identification Strategy: Nonlinear Difference in Differences

- The treatment effect on the treated has the following expression [Puhani, 2012]:

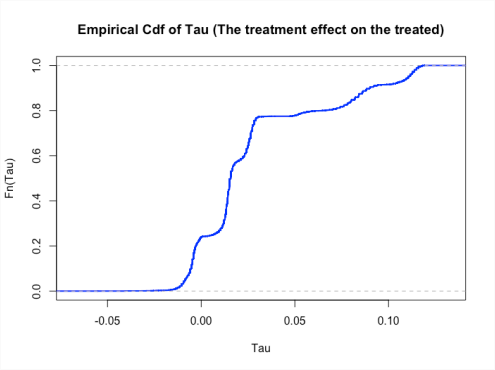
$$\tau(G=1, T=1, X) = \Phi(\alpha + \beta + XW\gamma + X\theta) - \Phi(\alpha + \beta + X\theta) \tag{1}$$

- Let $\kappa = (\alpha, \beta, \gamma, \theta)$. Consistent estimator $\hat{\kappa}$ of κ is obtained from a probit regression of Y_{it} on G_{it}, T_{it}, $W_{it} = G_{it}.T_{it}$ and X_i.
- It follows from Continuous Mapping Theorem (CMT), that $\hat{\tau}(G=1, T=1, X)$ is a consistent estimator of $\tau(G=1, T=1, X)$. With,

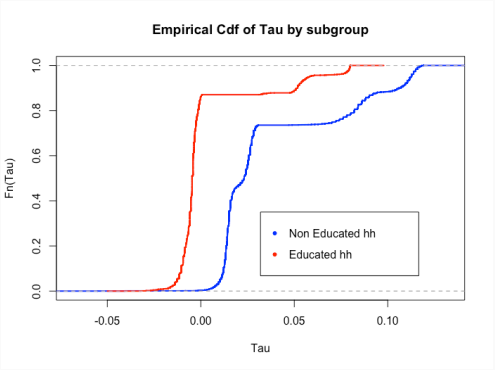
$$\hat{\tau}(G=1, T=1, X) = \Phi(\hat{\alpha} + \hat{\beta} + XW\hat{\gamma} + X\hat{\theta}) - \Phi(\hat{\alpha} + \hat{\beta} + X\hat{\theta})$$

Estimation

Estimation results



(a) Empirical Cdf of the Treatment effect on the treated

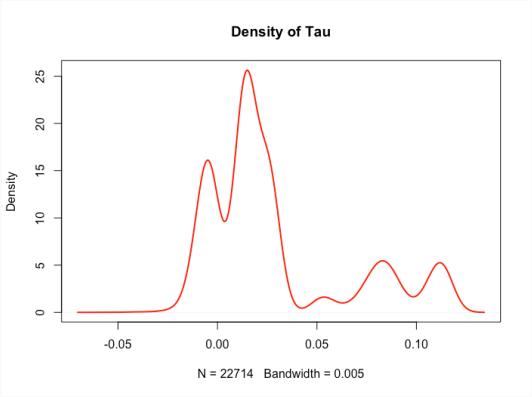


(b) Empirical Cdf of the Treatment effect on the treated for Educated hh and Non educated hh

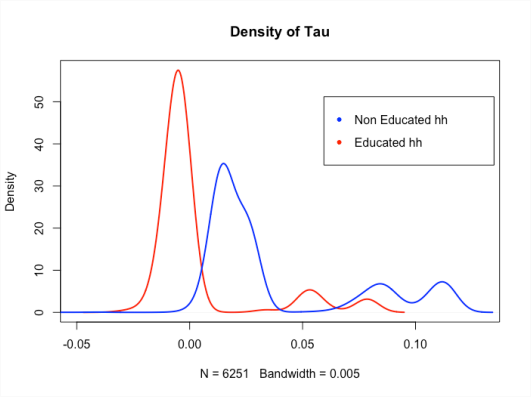
Figure 3: Empirical Cdf of the Treatment effect on the treated

- Non-educated household have uniformly higher treatment effect.
- Most educated hh did not respond to the policy.

Estimation results (Cont.)



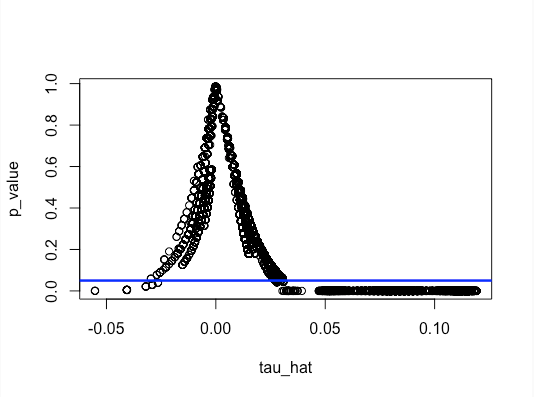
(a) Density of the Treatment effect on the treated



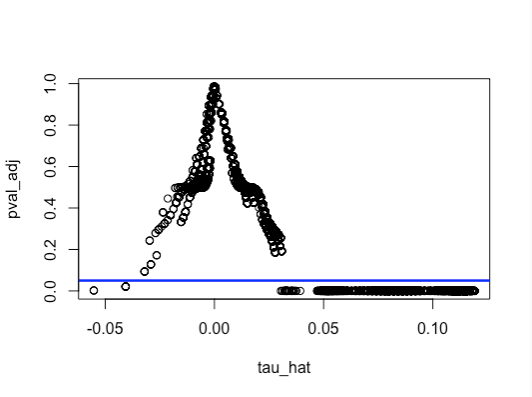
(b) Density of the Treatment effect on the treated for Educated hh and Non educated hh

Figure 4: Density of the Treatment effect on the treated

Estimation results (Cont.)



(a) p-values



(b) adjusted p-values

Figure 5: p-values as function of the estimated treatment effect on the treated.

- All the negative treatment effects are statistically equal to zero.

Constant time effect assumption/Placebo Analysis

1. Consider only older than 28 years old children
2. Younger than 35 years old are post-treatment observations

$$\tau(G=1, T=1, X) = \Phi(\alpha + \beta + XW\gamma + X\theta) - \Phi(\alpha + \beta + X\theta) \tag{2}$$

Table 1: Placebo Analysis

	$T = 1\{Age < 35\}$	$T = 1\{Age < 45\}$
$G \times T$	-0.11 (0.14)	0.12 (0.16)
$G \times T \times 1\{\text{Educ hh} = 0\}$	0.14 (0.10)	0.08 (0.09)
$G \times T \times 1\{\text{Cement floor} = 0\}$	-0.07 (0.08)	-0.06 (0.07)
Other Covariates	Yes	Yes

Treatment Effect Conditional on having at least one $>$ 18 years old non-educated child i

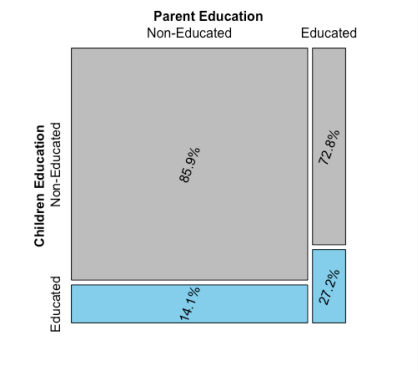
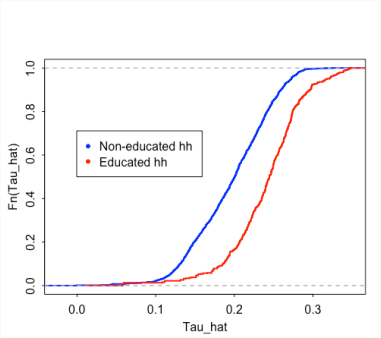


Figure 6: Education of daughters (in rural areas before the policy) and education of head of their households as function of each other.

Treatment Effect Conditional on having at least one > 18 years old non-educated child ii



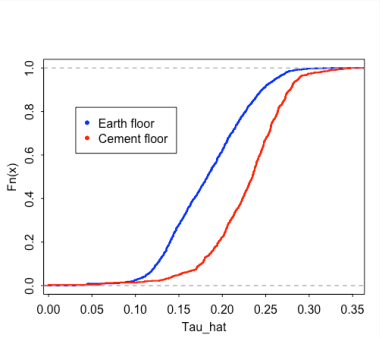


Figure 7: Empirical cdf of the estimated treatment effect for households with at least one > 18 years old non-educated child

Here educated households uniformly benefit more from the policy.

Conclusion

- MMI hypothesis holds in rural Benin.
- Education policy targeting primary education can be expected to
  1. reduce inequality of educational opportunities, and
  2. close the gap educated and non-educated families in term of probability of getting basic education.

Table 2: Two way table of education of daughters and head of households

	Educated hh	Non-educated hh	Total
Educated daughter	17.80	28.71	46.51
Non-educated daughter	5.67	47.81	53.49
Total	23.47	76.52	100

return

Nonlinear Difference in Differences (Cont.)

High false rejection rate problem: Benjamini and Hochberg procedure [Benjamini and Hochberg, 1995]

Let R be the total number of rejection and V be the total number of false rejection.

We want the False Discovery Rate to be small. BH(q) controlled $\frac{E(V)}{\max\{R,1\}} \leq q$.

- Sort the p-values from smallers to largest $p_{(1)} \leq p_{(2)} \leq \cdots \leq p_{(n)}$.
- Find the largest sorted p-value $p_{(i)}$ such that $p_{(1)} \leq q\frac{i}{n}$.
- Reject only hypothesis 1 to i.

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