

Roads and regional development: Evidence from Ohio

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Outline

Presentation preview

1. Research Question and Literature Review
2. Data
3. Experiment Design
4. Results
5. Assumption testing

Roads are important

Prior Econ Literature

JEL code **R42**: Government and Private Investment Analysis •
Road Maintenance • Transportation Planning

1. Asher and Novosad (2020) -

Setting: India

Policy: Pradhan Mantri Gram Sadak Yojana (PMGSY) in 2000

Design: Regression Discontinuity Design (RDD)

Conclusion: Limited causal effect on changes to employment in the village firms after 4 years, but large reallocation of labor out of agriculture.

Roads are important

Prior Econ Literature

2. Yogita Shamdasani (2021) -

Setting: India

Policy: Pradhan Mantri Gram Sadak Yojana (PMGSY) in 2000

Design: Difference-in-Differences (DID)

Conclusion: New roads induce movement of workers out of agriculture for villages with access to non-agricultural sector. However, large gains in agricultural output for villages with little access to non-agricultural sector

Roads are important

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3. Ren Mu and Van De Walle (2010) -

Policy: Rural Transport Project I (RTPI) in Vietnam

Design: Difference-in-Differences (DID)

Conclusion: It takes atleast 27 months to see any effect on economic development. Large increase in frequency of markets, primary school completion rates and households switch from agriculture to non-agriculture sector.

All roads lead to Roads

Research Question

how does maintaining good roads affect regional development?

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Our contribution to this literature

1. Developed country

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4. Use median sale amount of a property

All roads lead to Roads

Research Question

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Our contribution to this literature

1. Developed country
2. Natural experiment
3. Covers longer time period after intervention
4. Use median sale amount of a property
5. Looking at renewals only

Main result:

We find an average effect of about \$19,000 starting year 4 to year 9

Data

Sources:

1. Ohio Secretary of State's Office
2. CoreLogic
3. U.S. Census Bureau

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1991-2018

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Variables:

Dependent variable: Sale amount of a property in county subdivision (or village) i and period t

Running variable: % Votes in favor for renewal of a road tax levy.

Cutoff = 50%

Covariates: Village-specific characteristics

Specific Variables

Quasi-Experiment Design: getting a little "jumpy"

Model equation

$$Y_{it} = \alpha + \tau D_{it} + \beta_1 X_{it} + \beta_2 D_{it} X_{it} + \delta_1 W_{1it} + \dots + \delta_k W_{kit} + \epsilon_{it}$$

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where

$i \in \{1, \dots, N\}, T \in \{1, \dots, T\}, \text{ for } N, T \in \mathbb{Z}_+$

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X_{it} : % vote share for renewing a road tax levy for village i at time t

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$$D_{it} = \begin{cases} 1 & , \text{ if \% vote share } \geq 50, \\ 0 & , \text{ if \% vote share } < 50 \end{cases}$$

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W_{kit} : k^{th} covariate for village i at time t

τ : parameter of interest i.e. effect of passing a road tax levy on property sale amount

ϵ_{it} is the purely random error

Quasi-Experiment Design: getting a little "jumpy"

Specifications:

- bandwidth selection: m_{serd}
- kernel: triangular
- p : order of local polynomial for point estimator
- q : order of local polynomial for bias correction

Results

RDD estimate τ

year	Conventional	Bias-corrected	Robust	p-value
t+ 1	1581	3403	3403	≥ 0.05
t+ 2	12970	15825	15825	≥ 0.05
t+ 3	9215	10757	10757	≥ 0.05
t+ 4	18798	21060	21060	<0.05
t+ 5	17527	19520	19520	<0.05
t+ 6	14351	15076	15076	<0.05
t+ 7	15951	15951	15951	<0.05
t+ 8	18425	20883	20883	<0.05
t+ 9	18471	20399	20399	<0.05
Average	17254	18815	18815	

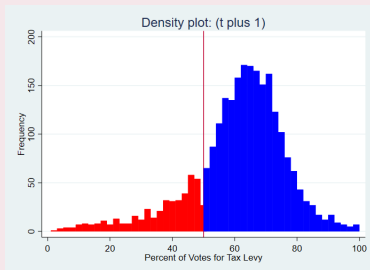
Results

Median Sale Amount of property after 4 years for villages with similar characters, which barely failed vs ones that barely passed the road tax levy



Assumption testing

Manipulation of running variable at cutoff



N	1296
p	2
q	3
pval	0.816094

Assumption testing

Similarity between villages near threshold

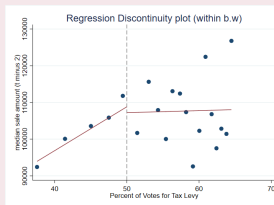
Key assumption of RDD is that observations close enough to the cutoff are very similar in characteristics, and because these observations (i.e. villages) do not know before voting whether the road tax levy will be passed or failed, randomization is achieved.

We checked

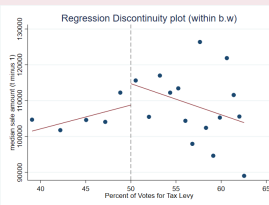
- similarity in baseline characteristics
- using covariates as outcome variable (no "jump" observed)

Assumption testing

Years before the voting

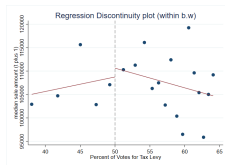


(a) 2 years before

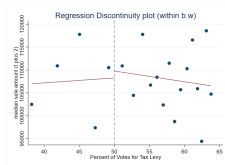


(b) 1 year before

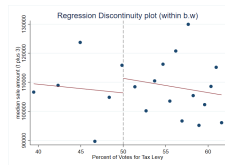
RD plots for 10 years: page 1



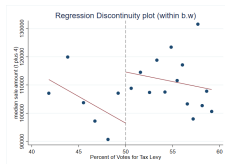
(a) after year 1



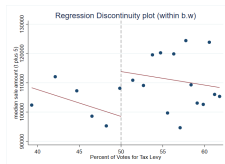
(b) after year 2



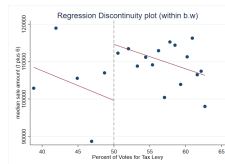
(c) after year 3



(d) after year 4

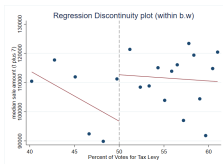


(e) after year 5

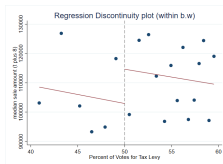


(f) after year 6

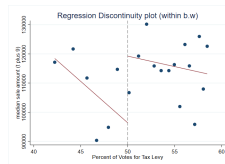
RD plots for 10 years: page 2



(a) after year 7



(b) after year 8



(c) after year 9

Main RD plot

Village-specific covariates

Examples

1. Population rate
2. Poverty rate
3. Percent white
4. Percent with kids
5. Percent with education less than a high school degree
6. Percent under rent
7. Percent aged between 18 to 64