Educate to Lead? The Local Political Economy Effects of School Construction in Indonesia

Monica Martinez-Bravo

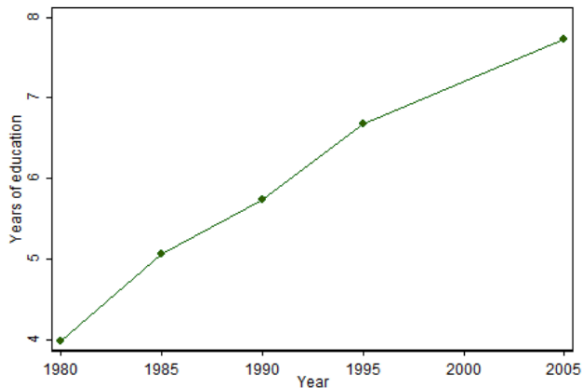CEMFI

December 15th, 2014

European Winter Meeting of the Econometric Society

Introduction

Rapid Expansion of Education Across the Developing World

- In the last decades, developing countries have experienced massive increases in education.

Source: IPUMS. Sample: Java

Introduction

The Political Economy Effects of a Rapid Expansion of Education

- A large literature studied the effects on labor force productivity and economic growth (Bills and Klenow 2000, Duflo 2000, Caselli 2005).

- Less is understood of the effects on *local governance* of mass education.
  - The education of local politicians also increases.
  - Potential large impact on local governance effectiveness.

Introduction

This Paper

- I study the impact of a large program of school construction in Indonesia on local governance & local public goods.

- INPRES School Construction Program
  - 61,000 new schools constructed between 1974 - 1978
  - The stock of schools doubled
  - The education level of the population substantially increased Duflo (2001, 2004)

- **Key Challenge:** Discern between public good increases driven by
  - More educated labor force
  - Better local governance (more educated politicians)

Introduction

Empirical Strategy

- I construct a panel dataset of public good provision for 10,000 villages in Indonesia covering 17 years.

- I combine the presence of the INPRES school construction program with other sources of variation:
  - Minimum age requirement for candidates of Village Head (VH):
    - 25 years old.
  - The first treated cohort turns 25 in the year 1992.
  - Village elections in Indonesia take place every 8 years
  - Village electoral cycles are not synchronised.

Introduction

Empirical Strategy & Results

- **Empirical Strategy:** I exploit the staggered timing of the village elections after 1992 to identify the effects on public good provision driven by changes in village governance.

- **Overview of the Results:**
    1. Large impact of improved governance on public goods.
    2. The effects are heterogenous: greater improvements for goods in higher demand.
    3. **Overview of the mechanisms:** Results driven by having more educated local politicians in office: they spend more on development projects and manage them more efficiently.

Outline

Outline of the Rest of the Talk

1. Related Literature
2. Institutional Context
3. Data and Baseline Empirical Specification
4. Reduced Form Results
5. 2SLS strategy, Results, and Robustness
6. Mechanisms
7. Conclusions

1. Related Literature

Related Literature

- Literature on the effect of leaders on economic performance and policy outcomes
  - Jones and Olken (2005)
  - Besley, Pande and Rao (2005), Besley, Montalvo and Reynal-Querol (2011)
- Literature on the effect of institutions on political selection and outcomes
  - Caselli & Morelli (2004), Besley & Kudamtsu (2008), Acemoglu, Egorov, & Sonin (2010), Ferraz & Finan (2011), Gagliarducci & Nannicini (2013), Brollo et al (2013), Besley et al (2013), Beath et al (2014).

Institutional Context

Institutional Context

Institutional Context

Administrative & Political Context

- I focus on rural villages of Java
- New Order (1965-1998), Government of Suharto.
- Non-democratic regime.
  - General Elections held every 5 years, but highly controlled
  - Legal framework for Village Government was established by Law no. 5 of year 1979
  - Imposed uniformity of governance structures across Indonesia.
  - Village Heads (VH) have a lot of power in the villages
  - Elections for VH every 8 years. Can serve at most 2 terms.

Institutional Context

Public Good Provision in Villages

- Public goods funded by village budget or by central government (special grants)
- Development projects typically managed by the VH

- <u>Mechanisms:</u> How can VH affect public good provision in the village?
  1. By affecting the <u>village budget</u>
  2. By <u>lobbying</u> upper levels to obtain projects for the village
  3. Better <u>management</u> of project implementation

Data and Empirical Specification

Data and Empirical Specification
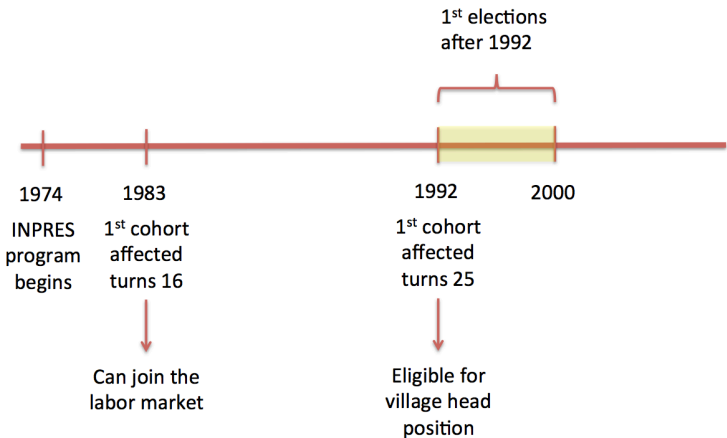
3. Data and Baseline Empirical Specification

Data

- Village Census (Potensi Desa or PODES)
  - Waves: 1986, 1990, 1993, 1996, 2000, 2003

  - Sample of 10,591 villages for 6 years: 63,000 observations
  - Large set of measures of public good provision:
    - Health, education facilities, household access to basic services

3. Data and Baseline Empirical Specification

3. Data and Baseline Empirical Specification

Reduced Form Empirical Specifications

- Baseline Model

$$y_{vpt} = \rho_0 + \rho_1 postel92_{vpt} + \rho_2 postel92_{vpt} \times Num\_INPRES_{vp}$$
$$+ \alpha_v + \delta_t + \gamma_p \times \delta_t + \varepsilon_{vpt}$$

- Heterogeneous Effects by Villagers' Demands

$$y_{vpt} = \lambda_0 + \lambda_1 postel92_{vpt} + \lambda_2 postel92_{vpt} \times Demand_{vp}$$
$$+ \alpha_v + \delta_t + \gamma_p \times \delta_t + \varepsilon_{vpt}$$

- Main Identification Assumption:
  - The timing of the 1st election post-1992 is *quasi-random*.
  - As good as randomly assigned, conditional on controls.

Table 2. Determinants of Timing of the 1st election post 1992

	(1)	(2)	(3)
	Dependent Variable: Year of the 1st election after 1992		
	Coefficient	Standard Error	Standardized Effect
Number of Primary Schools	-0.113	(0.080)	-0.013
Number of High Schools	-0.028	(0.019)	-0.012
Number of Doctors	-0.024	(0.032)	-0.008
Number of Midwives	0.000	(0.017)	0.000
Number of Polyclinics	0.075	(0.055)	0.011
Number of Health Post	0.005	(0.025)	0.002
Purified Water for drinking	0.024	(0.044)	0.006
Critical Land	-0.017	(0.016)	-0.010
Most HH have garbage bin	-0.040	(0.032)	-0.015
Asphalt/Hardened road	-0.009	(0.011)	-0.007
Horse-drawn cart (*pedati*)	-0.016*	(0.009)	-0.014
Log Population	-0.439	(1.058)	-0.004
Percentage of Rural HH	-0.011	(0.051)	-0.002
Urban village	-0.018	(0.020)	-0.009
Village Cooperative	-0.008	(0.025)	-0.003
Other type of Village Cooperative	-0.026*	(0.014)	-0.019
Village Group Shop	0.022	(0.027)	0.009
Number of Churches	-0.066	(0.041)	-0.016
Number of Mosques	0.028	(0.027)	0.008
Number of Markets	-0.011	(0.040)	-0.003
Number of Banks	-0.068**	(0.029)	-0.032

3. Data and Baseline Empirical Specification

Determinants of Timing of the 1st election post 1992

- The timing of the 1st post-1992 election is correlated with pre-election changes of 3 covariates (2 significant at the 10%, 1 at the 5% level).
- Out of 50 regressions, these represent 6% of them.
- These correlations could have been generated by chance, hence consistent with the quasi-random assumption.

4. Reduced Form Results

4. Reduced Form Results

4. Reduced Form Results

Table 3. The Effect of School Construction on Public Goods

	(1)	(2)	(3)	(4)
		Dependent Variables:		
	Number of Kindergarten	Number of Primary Schools	Number of High Schools	Number of doctors
Dep. Var. Mean	*1.229*	*3.299*	*0.428*	*0.158*
post 1st Election after 1992	-0.005	0.001	0.002	-0.000
	(0.009)	(0.008)	(0.006)	(0.008)
post * Num INPRES schools[§]	0.048***	0.069***	0.025***	0.019***
	(0.011)	(0.015)	(0.005)	(0.006)
Observations	63,546	63,546	63,546	52,920
Number of villages	10,591	10,591	10,591	10,584
R-squared	0.892	0.960	0.914	0.740

Notes: Robust Standard errors clustered at the district level in parenthesis. The sample includes 82 districts. The unit of observation is the village-year level. The dependent variable is defined by the column headings. The years included in all regressions are 1986, 1990, 1993, 1996, 2000 and 2003, except for number of doctors which is not reported in the year 2000. § The number of INPRES schools is defined in deviations from its sample mean. *** p<0.01, ** p<0.05, *p<0.1.

Table 4A. Heterogeneous Effects of School Construction on Public Goods

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								Dependent Variables:	
	Num Primary Sch		Number of Doctors			Number of Midwives			
Dep Var Mean	*3.30*	*3.30*	*0.16*	*0.16*	*0.16*	*1.62*	*1.62*	*1.62*	*1.62*
post 1st Elec after 1992	0.001	-0.039***	-0.000	-0.008	-0.060***	-0.003	-0.011	-0.123***	-0.025
	(0.008)	(0.013)	(0.008)	(0.008)	(0.012)	(0.020)	(0.020)	(0.031)	(0.021)
post * INPRES schools§	0.069***		0.019***			0.020			
	(0.015)		(0.006)			(0.016)			
post*low schooling rate		0.089***							
		(0.020)							
post*infectious disease				0.106***			0.109**		
				(0.034)			(0.049)		
post*mortality 25th-50th					0.054***			0.104***	
					(0.012)			(0.032)	
post*mortality 50th-75th					0.081***			0.176***	
					(0.016)			(0.043)	
post*mortality >75th					0.126***			0.234***	
					(0.021)			(0.048)	
post*fertility 25th-50th									0.076
									(0.063)
post*fertility 50th-75th									0.018
									(0.061)
post*fertility >75th									0.197**
									(0.087)
Observations	63,546	63,546	52,920	52,920	52,920	63,522	63,522	63,522	63,522
R-squared	0.960	0.960	0.740	0.740	0.740	0.845	0.845	0.846	0.845
Number of Villages	10,591	10,591	10,584	10,584	10,584	10,587	10,587	10,587	10,587

Table 4B. Heterogeneous Effects of School Construction on Public Goods

	(10)	(11)	(12)	(13)	(14)	(15)
	Number of Polyclinics			Number of Health Posts		
Dep Var Mean	*0.04*	*0.04*	*0.04*	*4.30*	*4.30*	*4.30*
post 1st Elec after 1992	-0.002	-0.004	-0.021***	-0.138	-0.131	-0.319**
	(0.003)	(0.004)	(0.004)	(0.102)	(0.104)	(0.125)
post * INPRES schools§	0.009***			0.136		
	(0.003)			(0.125)		
post*low schooling rate						
post*infectious disease		0.032***			0.044	
		(0.010)			(0.220)	
post*mortality 25th-50th			0.013***			0.120
			(0.004)			(0.105)
post*mortality 50th-75th			0.023***			0.205
			(0.004)			(0.123)
post*mortality >75th			0.048***			0.497**
			(0.007)			(0.205)
post*fertility 25th-50th						
post*fertility 50th-75th						
post*fertility >75th						
Observations	63,545	63,545	63,545	41,608	41,608	41,608
R-squared	0.673	0.673	0.674	0.639	0.639	0.640
Number of Villages	10,591	10,591	10,591	10,402	10,402	10,402

Table 4C. Heterogeneous Effects of School Construction on Public Goods

	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
						Dependent Variables:						
	Safe Drinking Water			Critical (polluted) land			Bin Garbage Disposal			Asphalt / Hard Road		
Dep Var Mean	*0.05*	*0.05*	*0.05*	*0.12*	*0.12*	*0.12*	*0.57*	*0.57*	*0.57*	*0.92*	*0.92*	*0.92*
post 1st Elec after 1992	-0.003	-0.010***	-0.006**	-0.002	-0.003	0.000	0.002	-0.012	-0.001	0.001	-0.024***	-0.012***
	(0.002)	(0.004)	(0.003)	(0.006)	(0.007)	(0.007)	(0.007)	(0.010)	(0.008)	(0.003)	(0.004)	(0.004)
post * INPRES schools[§]	0.004			0.002			-0.015*			-0.004		
	(0.003)			(0.005)			(0.008)			(0.004)		
post*mortality > 50th		0.017***			0.001			0.027**				
		(0.006)			(0.006)			(0.012)				
post*bad baseline service			0.067**			-0.040**			0.082***			0.235***
			(0.029)			(0.017)			(0.020)			(0.016)
post*far from subdistrict												0.044***
												(0.008)
Observations	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,480	63,480	63,480
R-squared	0.740	0.740	0.741	0.588	0.588	0.588	0.802	0.802	0.803	0.578	0.596	0.579
Number of villages	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591

5. 2SLS strategy, Results, and Robustness

5. 2SLS strategy, Results, and Robustness

5. 2SLS strategy, Results, and Robustness

2SLS Empirical Specifications

- Model of Interest

$$y_{vpt} = \beta_0 + \beta_1 educ_{vpt} + \alpha_v + \delta_t + \gamma_p \times \delta_t + u_{vpt}$$

- First Stage

$$educ_{vpt} = \gamma_0 + \gamma_1 postel92_{vpt} + \gamma_2 postel92_{vpt} \times Num\_INPRES_{vp}$$
$$+ \alpha_v + \delta_t + \gamma_p \times \delta_t + \epsilon_{vpt}$$

- **Exclusion Restriction**: Conditional on controls, the timing of the 1st election-post 1992 only affects outcomes through changing the level of education of the local politician.

5. 2SLS strategy, Results, and Robustness

Table 6. First Stage

	(1)	(2)	(3)	(4)	(5)	(6)
			Dependent Variable: Years of Education of the Village Head			
Dep. Var. Mean	*9.84*	*9.84*	*9.84*	*9.84*	*9.84*	*9.84*
post 1st Election after 1992	1.642***	0.422***	0.534***	0.530***	0.344**	0.415***
	(0.068)	(0.087)	(0.088)	(0.087)	(0.134)	(0.090)
post 1st Election after 1992*Num INPRES schools[§]				0.052		
				(0.040)		
post 1st Election after 1992*Election in 93-94					0.137	
					(0.234)	
post 1st Election after 1992*Election in 95-96					0.497***	
					(0.144)	
post 1st Election after 1992*Election in 97-98					0.298**	
					(0.134)	
post 1st Election after 1992*Election in 99-00					0.443**	
					(0.213)	
post 1st Election after 1992* Young VH						1.059***
						(0.121)
Village FE	N	Y	Y	Y	Y	Y
Year FE	N	Y	Y	Y	Y	Y
Province FE * Year FE	N	N	Y	Y	Y	Y
Observations	63,546	63,546	63,546	63,546	63,546	63,546
R-squared	0.528	0.582	0.596	0.596	0.597	0.600

Table 7A. Heterogeneous Effects of Village Head on Education and Health Outcomes (2SLS results)

	Num Primary Sch		Number of Doctors			Number of Midwives			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	A. Regression Results								
Dep Var Mean	*3.30*	*3.30*	*0.16*	*0.16*	*0.16*	*1.62*	*1.62*	*1.62*	*1.62*
years of educ VH	0.093***	-0.021	0.027*	-0.000	-0.033**	0.021	-0.008	-0.074**	-0.002
	(0.025)	(0.017)	(0.016)	(0.015)	(0.015)	(0.032)	(0.033)	(0.033)	(0.032)
edu*low schooling rate		0.054***							
		(0.010)							
edu*infectious disease				0.063***			0.066**		
				(0.018)			(0.028)		
edu*mortality 25th-50th					0.029***			0.058***	
					(0.006)			(0.017)	
edu*mortality 50th-75th					0.047***			0.104***	
					-0.01			(0.026)	
edu*mortality >75th					0.073***			0.139***	
					(0.012)			(0.026)	
edu*fertility 25th-50th									0.021**
									(0.010)
edu*fertility 50th-75th									0.017*
									(0.010)
edu*fertility >75th									0.036***
									(0.013)
Observations	63,546	63,546	52,920	52,920	52,920	63,522	63,522	63,522	63,522
Number of villages	10,591	10,591	10,584	10,584	10,584	10,587	10,587	10,587	10,587
Cragg-Donald F-Stat	22.94	22.76	11.10	10.71	5.273	23.04	22.43	11.05	11.37
	B. Effect of 1 extra years of education of the VH as a percent of the sample mean (for top demand villages)								
1 extra year of education	0.03	0.01	0.17	0.40	0.25	0.01	0.04	0.04	0.02

Table 7B. Heterogeneous Effects of Village Head on Education and Health Outcomes (2SLS results)

	Dependent Variables:					
	Number of Polyclinics			Number of Health Posts		
	(10)	(11)	(12)	(13)	(14)	(15)
A. Regression Results						
Dep Var Mean	*0.04*	*0.04*	*0.04*	*4.29*	*4.29*	*4.29*
years of educ VH	0.007	-0.004	-0.015***	0.003	-0.142	-0.276***
	(0.006)	(0.006)	(0.006)	(0.152)	(0.099)	(0.098)
edu*low schooling rate						
edu*infectious disease		0.019***			0.037	
		(0.006)			(0.165)	
edu*mortality 25th-50th			0.007***			0.074
			(0.002)			(0.074)
edu*mortality 50th-75th			0.013***			0.137
			(0.003)			(0.095)
edu*mortality >75th			0.029***			0.398***
			(0.004)			(0.146)
edu*fertility 25th-50th						
edu*fertility 50th-75th						
edu*fertility >75th						
Observations	63,545	63,545	63,545	41,608	41,608	41,608
Number of villages	10,591	10,591	10,591	10,402	10,402	10,402
Cragg-Donald F-Stat	22.95	22.33	11.00	56.16	56.69	27.96
B. Effect of 1 extra years of education of the VH as a percent of the sample mean						
1 extra year of education	0.16	0.35	0.33	0.00	-0.02	0.03

Table 7C. Heterogeneous Effects of Village Head on Education and Health Outcomes (2SLS results)

	Safe Drinking Water			Critical (polluted) land			Bin Garbage Disposal			Asphalt / Hard Road		
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
						A. Regression Results						
Dep Var Mean	*0.05*	*0.05*	*0.05*	*0.12*	*0.12*	*0.12*	*0.57*	*0.57*	*0.57*	*0.92*	*0.92*	*0.92*
years of educ VH	-0.000	-0.009**	-0.008	-0.002	-0.004	-0.002	-0.017	-0.006	0.002	-0.003	-0.007	-0.008
	(0.005)	(0.005)	(0.005)	(0.013)	(0.011)	(0.011)	(0.016)	(0.013)	(0.013)	(0.006)	(0.008)	(0.006)
edu*mortality > 50th		0.010***			0.000			0.017**				
		(0.003)			(0.004)			(0.007)				
edu*bad baseline service			0.035**			-0.020**			0.008***			0.145***
			(0.017)			(0.009)			(0.002)			(0.018)
edu*far from subdistrict												0.026***
												(0.005)
Observations	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,480	63,480	63,480
Number of villages	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591
Cragg-Donald F-Stat	22.94	22.37	22.00	22.94	22.37	22.00	22.94	22.37	22.29	22.91	21.91	21.95
	B. Magnitude of the Effects: Effect of X extra years of education of the VH as a percent of the sample mean (for top demand villages)											
1 extra year of education	0.00	0.02	0.51	-0.02	-0.03	-0.18	-0.03	0.02	0.02	0.00	0.15	0.02
1 Stand Dev (=3.13 years of educ)	0.00	0.06	1.68	-0.05	-0.11	-0.60	-0.10	0.06	0.06	-0.01	0.49	0.06

5. 2SLS strategy, Results, and Robustness

Threats to the Exclusion Restriction

1. The INPRES program could have also affected the level of **education of the electorate**.
   - $\rightarrow$ I compare the results to villages that have an appointed village head:
     - I also find effects in villages with an appointed village head. The electorate is not driving the results.
     - Results

2. The **age of the VH** might also change
   - $\rightarrow$ I add age of the VH as an endogenous regressor.
     - The coefficient on age is insignificant and the coefficients on education not affected.
     - Results

6. Mechanisms

6. Mechanisms

Mechanisms

- Mechanisms: 3 ways through which educated VH could influence public good provision

  1. Through the <u>village budget</u> $\rightarrow$ spending more on development projects

  2. <u>Lobbying</u> upper levels to obtain projects for the village

  3. Better <u>management</u> of project implementation

6. Mechanisms

Additional Empirical Evidence on Mechanisms (I)

- The effect of more educated VH on the **village budget**.
  - Only reported in 1996 $\rightarrow$ cross-section analysis
  - No evidence of lobbying: More educated VH <u>do not</u> receive more funds from upper levels.
  - Some evidence of more expenditure allocated to development projects: More educated VH spend more in infrastructure.
  - <u>Results</u>

6. Mechanisms

Additional Empirical Evidence on Mechanisms (II)

- The effect of more educated VH on **management** of **development projects**.
    - Only reported in 1986 $\rightarrow$ cross-section analysis
    - More educated VH start more development projects funded by villagers.
    - Evidence on management
        - Measure of efficiency in the management of public projects (similar to Roger & Rasul (2013))
        - Project duration, conditional of project type & completion rate.
    - Some evidence of better management: More educated VH complete projects in shorter time.
    - <u>Results</u>

Conclusion

Conclusion

- The education of village heads increases public good provision:
  - One additional year of education of village heads leads to:
  - 3% increase in the number of primary schools
  - 17% increase in the number of doctors
- Heterogenous effects across villages: public good increases respond to underlying village needs.
- Most likely mechanism: greater spending on development projects & more effective management of projects
- The results suggest that the the education of local politicians is a key ingredient of the quality of public services in developing countries.

Conclusion

Thanks!

Additional Slides

Timing of 1st Elections post-1992

| Year	Number of villages having their 1st election post-1992 in the corresponding year	Percent
1992	435	4.11
1993	756	7.14
1994	624	5.89
1995	253	2.39
1996	123	1.16
1997	1,375	12.98
1998	3,011	28.43
1999	3,757	35.47
2000	257	2.43
Total	10,591	100

Additional Slides

Construction of Election Timing

- Village Heads report their length of tenure in the 1993 census.
  - If length of tenure $\in \{0, 1\}$ years $\rightarrow$ elected between 1992 and 1993.
    - I assume that election was the first election post-1992.
  - If length of tenure $\in \{2, 10\}$ years $\rightarrow$ the next election is in 6 years
    - First election-post-1992 is 1999.
  - If length of tenure $\in \{3, 11\}$ years $\rightarrow$ the next election is in 5 years
    - First election-post-1992 is 1998.
  - etc.

Additional Slides
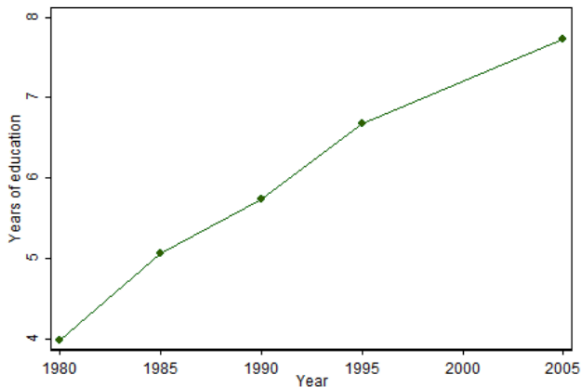

Number of village heads by age
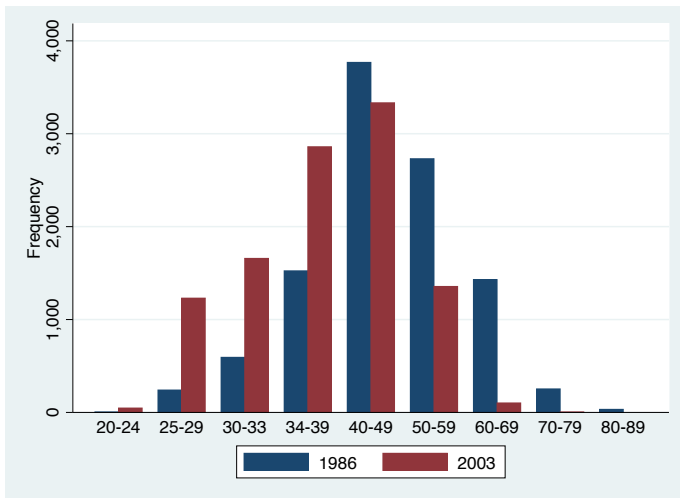
Additional Slides

Effects on Age of VH

|	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: Years of Education of the Village Head					
Dep. Var. Mean	*43*	*43*	*43*	*43*	*43*	*43*
post 1st Election after 1992	-1.191***	-3.135***	-3.509***	-3.512***	-3.040***	-2.558***
	(0.164)	(0.280)	(0.290)	(0.290)	(0.422)	(0.295)
post 1st Election after 1992*Num INPRES schools[§]				0.030		
				(0.119)		
post 1st Election*Election in 93-94					0.423	
					(0.630)	
post 1st Election*Election in 95-96					-1.966***	
					(0.445)	
post 1st Election*Election in 97-98					-1.001**	
					(0.448)	
post 1st Election*Election in 99-00					0.021	
					(0.767)	
post 1st Election after 1992* Young VH						-8.411***
						(0.446)
Village FE	N	Y	Y	Y	Y	Y
Year FE	N	Y	Y	Y	Y	Y
Province FE * Year FE	N	N	Y	Y	Y	Y
Observations	63,519	63,519	63,519	63,519	63,519	63,519
R-squared	0.369	0.455	0.476	0.476	0.477	0.502
Number of villages	10,665	10,665	10,665	10,665	10,665	10,665
Number of districts	82	82	82	82	82	82

Additional Slides

Average Years of Education of the Labor Force

Source: IPUMS. Sample: Java

back

Additional Slides

Number of village heads by education level
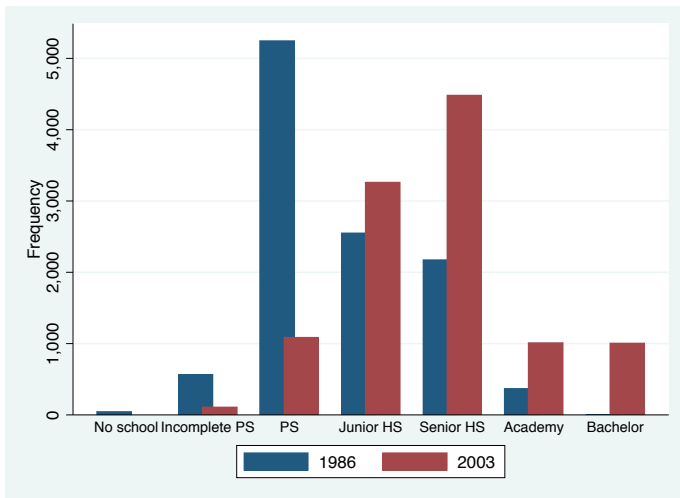
Additional Slides

Appendix Table 6A. Heterogeneous Effects of Village Head on Education and Health Outcomes (OLS results)

	Num Primary Sch		Number of Doctors			Number of Midwives				Number of Polyclinics			Number of Health Posts		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Dep Var Mean	*3.30*	*3.30*	*0.16*	*0.16*	*0.16*	*1.62*	*1.62*	*1.62*	*1.62*	*0.04*	*0.04*	*0.04*	*4.30*	*4.30*	*4.30*
years of educ VH	0.0000	-0.005**	0.0005	-0.001	-0.005***	-0.0004	-0.002	-0.018***	0.007***	-0.0003	-0.000	-0.002***	0.0142	0.014	-0.006
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.000)	(0.000)	(0.000)	(0.009)	(0.010)	(0.018)
edu*low schooling rate		0.010***													
		(0.003)													
edu*infectious disease				0.013***			0.018**				0.001			-0.001	
				(0.004)			(0.008)				(0.001)			(0.039)	
edu*mortality 25th-50th					0.007***			0.015**				0.001			0.007
					(0.002)			(0.006)				(0.001)			(0.020)
edu*mortality 50th-75th					0.007***			0.026***				0.003***			0.022
					(0.002)			(0.007)				(0.001)			(0.025)
edu*mortality >75th					0.011***			0.033***				0.004***			0.062*
					(0.003)			(0.007)				(0.001)			(0.035)
edu*fertility 25th-50th									-0.010***						
									(0.003)						
edu*fertility 50th-75th									-0.020***						
									(0.004)						
edu*fertility >75th									-0.028***						
									(0.005)						
Observations	63,546	63,546	52,920	52,920	52,920	63,522	63,522	63,522	63,522	63,545	63,545	63,545	41,608	41,608	41,608
R-squared	0.960	0.960	0.740	0.740	0.740	0.845	0.845	0.845	0.846	0.673	0.673	0.673	0.639	0.639	0.639
Number of villages	10,656	10,656	10,649	10,649	10,649	10,652	10,652	10,652	10,652	10,656	10,656	10,656	10,461	10,461	10,461

back

Additional Slides

Appendix Table 6B. Heterogeneous Effects of Village Head on Education and Health Outcomes (Reduced Form)

	Dependent Variables:											
	Safe Drinking Water			Critical (polluted) land			Bin Garbage Disposal			Asphalt / Hard Road		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dep Var Mean	*0.05*	*0.05*	*0.05*	*0.12*	*0.12*	*0.12*	*0.57*	*0.57*	*0.57*	*0.92*	*0.92*	*0.92*
years of educ VH	-0.001	-0.002***	-0.001*	0.001	0.001	0.001	0.001	-0.000	0.012***	-0.001	-0.004***	-0.001**
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
edu*mortality > 50th		0.002***			-0.001			0.002				
		(0.001)			(0.001)			(0.002)				
edu*bad baseline service			0.003			-0.005**			-0.025***		0.027***	
			(0.002)			(0.002)			(0.001)		(0.003)	
edu*far from subdistrict												0.003*
												(0.001)
Observations	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,546	63,480	63,480	63,480
R-squared	0.740	0.740	0.740	0.588	0.588	0.588	0.802	0.802	0.820	0.578	0.584	0.578
Number of villages	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591	10,591

Appendix Table 7. Robustness Check 2SLS Results

	(1)	(2)	(3)	(4)	(5)
			Different Set of Controls:		
	Baseline Specification	Controlling for population	Pre-treatment Dep Var*Year FE	INPRES schools * Year FE	Pre-treatment Covariates * Year FE
Number of Primary Schools	0.054***	0.051***	0.051***	0.045***	0.049***
(interaction with low enrolment)	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)
Number of Doctors	0.064***	0.061***	0.061***	0.062***	0.054***
(interaction with dengue outbreak)	(0.018)	(0.017)	(0.018)	(0.018)	(0.018)
Number of Polyclinics	0.019***	0.018***	0.019***	0.015***	0.018***
(interaction with dengue outbreak)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)
Number of Midwives	0.066**	0.057**	0.073***	0.065**	0.062**
(interaction with dengue outbreak)	(0.028)	(0.026)	(0.027)	(0.028)	(0.030)
Number of Midwives	0.038***	0.040***	0.033**	0.037***	0.039***
(interaction with >75th perc fertility)	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)
Purified Water for drinking	0.010***	0.010***	0.010***	0.010***	0.008**
(interaction with >75th perc mortality)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Purified Water for drinking	0.035**	0.036**	0.035**	0.035**	0.037**
(interaction with bad pre-treatment service)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)
Critical Land endangering Water Sources	-0.020**	-0.020**	-0.015**	-0.020**	-0.013*
(interaction with bad pre-treatment service)	(0.009)	(0.009)	(0.007)	(0.009)	(0.008)
Garbage bin	0.008***	0.008***	0.006***	0.008***	0.008***
(interaction with bad pre-treatment service)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Asphalt/Hardened road	0.026***	0.026***	0.008***	0.027***	0.021***
(interacted with distance to the subdistrict)	(0.005)	(0.005)	(0.002)	(0.005)	(0.005)
Asphalt/Hardened road	0.144***	0.144***	0.025***	0.145***	0.135***
(interaction with bad pre-treatment service)	(0.018)	(0.018)	(0.006)	(0.018)	(0.017)
Width of the main road	0.036***	0.036***	0.003**	0.037***	0.031***
(interacted with distance to the subdistrict)	(0.004)	(0.004)	(0.002)	(0.004)	(0.004)
Width of the main road	0.258***	0.258***	0.147	0.258***	0.260***
(interaction with bad pre-treatment service)	(0.029)	(0.029)	(0.129)	(0.029)	(0.032)

Additional Slides

First Stage by Years since the 1st Election post-1992
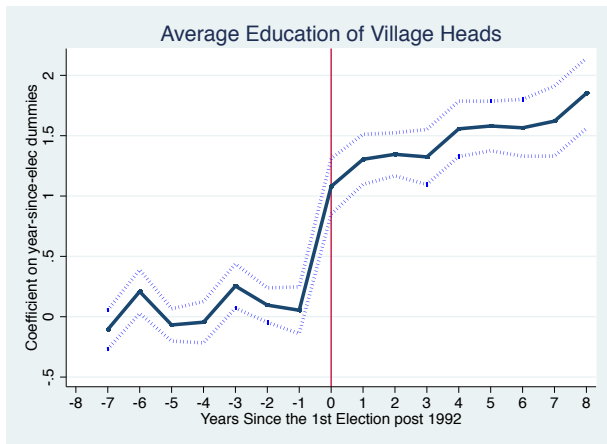
Table 8. Heterogeneous Effects by Method of Selection of the VH

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number of Doctors		Number of Midwives		Number of Polyclinics		Safe Drinking Water	
	VH Elec.	VH App.	VH Elec.	VH App.	VH Elec.	VH App.	VH Elec.	VH App.
Dep Var Mean	0.23		1.74		0.05		0.07	
years of educ VH	-0.047**	-0.094	-0.001	0.210***	-0.022***	0.026*	-0.007	0.062***
	(0.019)	(0.092)	(0.034)	(0.069)	(0.006)	(0.014)	(0.005)	(0.011)
edu*low schooling rate								
edu*infectious disease								
edu*mortality 25th-50th	0.028***	0.266**			0.006**	0.014		
	(0.006)	(0.125)			(0.002)	(0.021)		
edu*mortality 50th-75th	0.044***	0.321***			0.012***	0.035		
	(0.009)	(0.114)			(0.003)	(0.022)		
edu*mortality >75th	0.071***	0.340***			0.028***	0.031		
	(0.011)	(0.105)			(0.004)	(0.021)		
edu*fertility 25th-50th			0.017	0.017				
			(0.010)	(0.022)				
edu*fertility 50th-75th			0.013	0.006				
			(0.010)	(0.013)				
edu*fertility >75th			0.032**	-0.009				
			(0.013)	(0.025)				
edu*bad baseline service							0.035**	0.200***
							(0.017)	(0.053)
Observations	54,965		65,976		66,041		66,042	
Number of villages	10,993		10,996		11,007		11,007	
Cragg-Donald F-Stat	2.895		6.028		5.954		11.85	

back

Table 9. Robustness Checks to Controlling for VH Age back

	(1)	(2)	(3)	(4)	(5)
			Different Set of Controls:		
	Baseline, Years Educ* Predictor of Demand	Years Educ* Predictor of Demand	Age (Exogenous Regressor)	Years Educ* Predictor of Demand	Age (Endogenous Regressor)
Number of Primary Schools	0.054***	0.049**	0.015	0.054***	0.004
(interaction with low enrolment)	(0.010)	(0.021)	(0.045)	(0.010)	(0.006)
Number of Doctors	0.063***	0.066***	0.011	0.063***	0.004
(interaction with dengue outbreak)	(0.018)	(0.024)	(0.035)	(0.018)	(0.004)
Number of Doctors	0.073***	0.073***	0.001	0.073***	0.004
(interaction with >75th perc mortality)	(0.012)	(0.017)	(0.026)	(0.011)	(0.004)
Number of Midwives	0.066**	0.068**	0.009	0.063**	-0.008
(interaction with dengue outbreak)	(0.028)	(0.033)	(0.059)	(0.027)	(0.010)
Number of Midwives	0.139***	0.140***	0.002	0.134***	-0.008
(interaction with >75th perc fertility)	(0.026)	(0.036)	(0.060)	(0.029)	(0.010)
Number of Polyclinics	0.019***	0.019***	-0.002	0.020***	0.001
(interaction with dengue outbreak)	(0.006)	(0.006)	(0.011)	(0.006)	(0.002)
Number of Polyclinics	0.029***	0.027***	-0.004	0.030***	0.001
(interaction with >75th perc mortality)	(0.004)	(0.007)	(0.012)	(0.004)	(0.002)
Number of Health Post	0.398***	0.239	-0.252	0.431***	0.034
(interaction with >75th perc mortality)	(0.146)	(0.265)	(0.224)	(0.134)	(0.057)
Purified Water for drinking	0.010***	0.008	-0.005	0.010***	0.001
(interaction with >50th perc mortality)	(0.003)	(0.006)	(0.012)	(0.003)	(0.002)
Purified Water for drinking	0.035**	0.038**	-0.005	0.036**	0.001
(interaction with bad pre-treatment service)	(0.017)	(0.018)	(0.014)	(0.016)	(0.002)
Critical Land endangering Water Sources	-0.020**	-0.015	-0.009	-0.018	-0.006*
(interaction with bad pre-treatment service)	(0.009)	(0.022)	(0.028)	(0.011)	(0.003)
Garbage bin	0.017***	0.017	-0.000	0.018***	-0.005
(interaction with >50th perc mortality)	(0.007)	(0.011)	(0.023)	(0.007)	(0.004)
Garbage bin	0.008***	0.008***	0.008	0.008***	-0.006
(interaction with bad pre-treatment service)	(0.002)	(0.002)	(0.027)	(0.002)	(0.005)
Asphalt/Hardened road	0.026***	0.026***	-0.001	0.026***	-0.007**
(interacted with distance to the subdistrict)	(0.005)	(0.005)	(0.011)	(0.005)	(0.003)
Asphalt/Hardened road	0.145***	0.155***	0.020	0.141***	-0.007**
(interaction with bad pre-treatment service)	(0.018)	(0.040)	(0.042)	(0.015)	(0.003)

6. Mechanisms

Table 10A. Effect of VH Education on Village Government Revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Dependent Variable			
	Log Total Income	Log Surplus from last year	Log Income from Village Sources	Log Transfer from Central Government	Log Transfer from Provincial Government	Log Transfer from District Government	Log Other Income
Dep. Var. Mean (not logged)	40595	262	25878	6489	747	762	6456
				Panel A. OLS			
years of educ VH	0.020***	0.063***	0.027***	0.015	-0.076***	-0.012	0.067**
	(0.004)	(0.018)	(0.006)	(0.011)	(0.025)	(0.028)	(0.029)
				Panel B. 2SLS			
years of educ VH	-0.006	-0.251	-0.056	-0.119	-0.043	0.016	-0.017
	(0.039)	(0.181)	(0.082)	(0.141)	(0.293)	(0.261)	(0.217)
Observations	10,589	10,589	10,589	10,589	10,589	10,589	10,589
R-squared OLS	0.158	0.090	0.055	0.011	0.243	0.102	0.030

6. Mechanisms

Table 10b. Effect of VH Education on Village Government Expenditures

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
				Dependent Variable				
	Log Total Expenditures	Log Employee Expenses	Log Expenses in Goods	Log Expenses in Maintenance	Log Infraestructure Expenses	Log Production Facilities Expenses	Log Transportation Facilities Expenses	Log Social Facilities Expenses
Dep. Var. Mean (not logged)	*40,502*	*10,225*	*898*	*632*	*2,880*	*2,558*	*7,091*	*6,554*
				Panel A. OLS				
years of educ VH	0.020***	0.036***	0.012	0.052***	0.065**	0.074***	0.062***	0.048
	(0.004)	(0.005)	(0.008)	(0.014)	(0.031)	(0.025)	(0.023)	(0.030)
				Panel B. 2SLS				
years of educ VH	-0.005	-0.011	0.127**	0.036	0.686**	0.298	-0.068	0.427*
	(0.039)	(0.058)	(0.065)	(0.119)	(0.342)	(0.276)	(0.247)	(0.231)
Observations	10,589	10,589	10,589	10,589	10,589	10,589	10,589	10,589
R-squared OLS	0.157	0.096	0.036	0.018	0.031	0.046	0.025	0.028

back

6. Mechanisms

Table 11. Effect of VH Education on Village Development Projects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Dependent Variable				
			Number of projects by main source of funding:					
	Number of projects	Number of projects managed by the village	by the villagers	by central government grants	by central government budget allocation	Project duration	Project duration (controlling for project completon)	Project duration (controlling for project completon and type)
Dep. Var. Mean	5.73	4.60	2.42	1.52	1.47	7.44	3.57	3.57
				Panel A. OLS				
years of educ VH	0.0100	0.0243**	0.0262**	-0.0156**	0.0025	0.0527	-0.0382***	-0.0357***
	(0.012)	(0.012)	(0.012)	(0.006)	(0.006)	(0.045)	(0.012)	(0.012)
				Panel B. 2SLS				
years of educ VH	0.1301	0.1869**	0.2240**	-0.1048*	0.0299	-0.2849	-0.2122***	-0.1666***
	(0.102)	(0.089)	(0.100)	(0.056)	(0.048)	(0.293)	(0.059)	(0.060)
Observations	10,591	10,591	10,591	10,591	10,591	10,546	8,396	8,396
R-squared (OLS)	0.134	0.077	0.099	0.061	0.109	0.003	0.032	0.073

back