

# Institutions and Economic Development

*Correlation And/Or Causality?*

*Recent Empirical Approaches*

# Empirics of Institutions - why?

- Recent years witnessed a soaring interest in empirically assessing the effect of institutions on long-run economic development/growth
- Research provides an important step forward since the seminal work by North and Thomas
- Empirical challenges partially resolved, but new challenges emerged
- We are going to critically examine empirical approaches used in economics to estimate the role/impact/effect of institutions on various economic outcomes

# Institutions – what, why?

- Institutions are rules of the game in a society or, more formally, are the humanly devised constraints that shape human interactions (North 1990, page 3)
- Main points:
  - Humanly devised
  - Set constraints
  - Shape incentives
- The economic concept of institution is defined as constraints placed by law and social norms on human behavior
- These constraints help to reduce transaction costs

# Institutions – what, why?

- It is a broad cluster which includes many sublevels, e.g. property rights, contract enforcement
- Formal institutions: codified rules by law, e.g. in the constitutions
- Informal institutions: not legally codified, based on social norms (or conventions), accepted and expected standards of behaviour
- Informal institutions are based on culture, the set of beliefs and values passed from generation to generation

# Institutions – what, why?

- Why do we (should we) care?
- Vast differences in economic prosperity among countries
  - E.g. income per capita in sub-Saharan countries is on average  $1/20^{\text{th}}$  of per capita income in the United States
- Why???
- Standard answer offered by economists:
  - Differences in physical capital
  - Differences in human capital
  - Differences in technology

# Institutions – what, why?

- North and Thomas (1973) argue that we need to distinguish between *proximate* causes versus *fundamental* causes of prosperity
- Proximate causes are capital, technology
- Fundamental causes are can be
  - Institutions
  - Geography
  - Culture



# Institutions – an empirical problem

- The issue with institutions is that they are endogenous and develop in tandem with other determinants of economic development
- Institutions can be different because of
  - Geography
  - Culture
  - Other factors
- An old story by Montesquieu:
  - Geography determines human attitudes
  - Human attitudes determine both economic performance and political system
  - So institutions can be also determined by human attitudes

# Institutions – an empirical problem

➤ Why is it a problem?

➤ Causality vs Correlation

➤ To estimate a causal relationship between institutions and economic development

$$Y_i = \alpha + \beta * x_i + \gamma * institutions_i + \varepsilon_i$$

➤ Assuming that  $cov(x_i, \varepsilon_i) = 0$ , argument made earlier implies that  $cov(institutions_i, \varepsilon_i) \neq 0$

➤ => we can't interpret the estimated coefficient of  $\gamma$  as a causal relationship between institutions and economic development, but only as a correlation



# Solutions

- Various approach which attempt to isolate plausibly exogenous sources of variation of institutions
- Two main strategies:
  1. Finding institutions which exogenously vary across space because of
    - Geography
    - Historical events
  2. Instrumental variable estimation techniques
    - Finding a variable  $z_i$  which is highly correlated with a variable proxying institutions and not correlated with  $\varepsilon_i$ 
      - a.  $\text{cov}(z_i, \varepsilon_i) = 0$ ; can't be tested (often called exclusion restrictions)
      - b.  $\text{cov}(z_i, \text{institutions}_i) \neq 0$ ; can be tested
  3. Combination of point 1 and point 2

# AJR (2001): Colonial Origins of Comparative Development

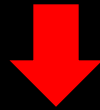
- Attempt to examine and establish a *causal* relationship between institutions and per capita income
- To do that, they need a source of exogenous variation in institutions
- Main arguments rest on:
  1. Different types of colonization policies created different set of institutions
  2. The colonization strategy was influenced by the feasibility of settlements
  3. The colonial institutions persisted after independence

# AJR (2001)

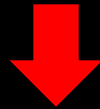
- Two extremes of colonization strategies:
  - *Extractive institutions* to transfer resources from the colony to the mother country which led to the creation of extractive institutions e.g. coerced labor, slavery, monopolies, legal discrimination
  - *Inclusive institutions* which replicated European institutions more conducive for economic growth
- The colonization strategy was influenced by **mortality rates** expected by the first European settlers (feasibility of settlement)

# AJR (2001)

Potential mortality of settlers



Colonization strategy



Past colonial institutions



Current institutions



Current performance

# AJR (2001)

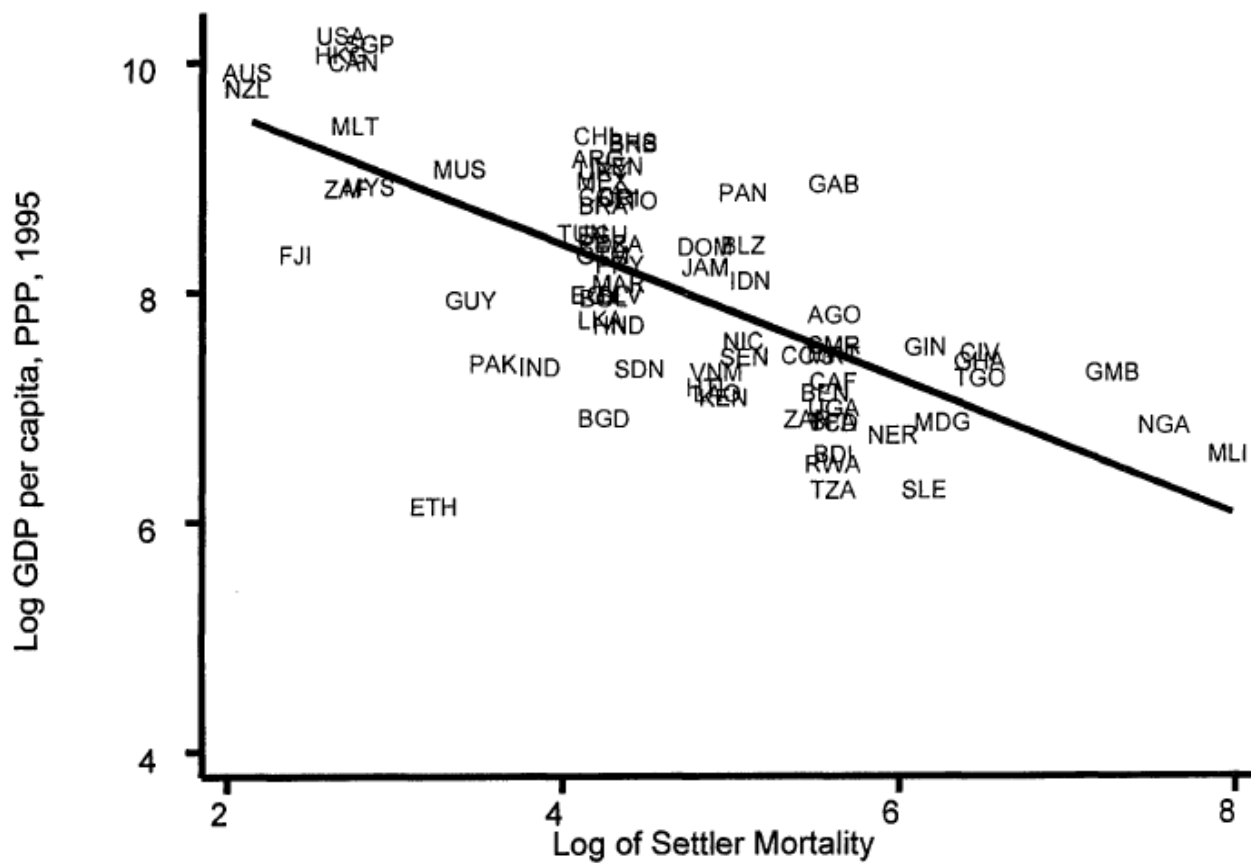


FIGURE 1. REDUCED-FORM RELATIONSHIP BETWEEN INCOME AND SETTLER MORTALITY

# AJR (2001)

- Assumption of exogeneity of settlers' mortality (exclusion restriction):
  - Conditional on other controls, the settlers' mortality rates have no effect on GDPpc today other than through institutional development
  - The main concern is that mortality rates of settlers are correlated with current disease environment which can have a direct effect on economic performance
  - If it was a case, settlers mortality would be assigning the *effect of disease on income* to institutions
  - AJR argue it is not the case as diseases were fatal for the Europeans but not so much for the indigenous population

# AJR (2001)

- Persistence of colonial institutions
  - Setting up and enforce institutions is costly – if the costs were sunk by the colonial powers, then it may not be beneficial for the elites after independence to change them
  - Gains from extractive institutions may depend on the size of the ruling elite; if the elite is small (often the case), it has no incentive to switch to 'inclusive institutions'
  - If irreversible investments which are complementary to a particular set of institutions were made, those who made them are more likely to make those institutions to persist

# AJR (2001)

- Variables capturing institutions:
  - Index of protection against expropriation

$$(1) \quad \log y_i = \mu + \alpha R_i + \mathbf{X}_i' \gamma + \varepsilon_i,$$

where  $y_i$  is income per capita in country  $i$ ,  $R_i$  is the protection against expropriation measure,  $\mathbf{X}_i$  is a vector of other covariates, and  $\varepsilon_i$  is a random error term. The coefficient of interest throughout the paper is  $\alpha$ , the effect of institutions on income per capita.

$$\text{COV}(\varepsilon_i, v_i) = 0$$

$$(5) \quad R_i = \zeta + \beta \log M_i + \mathbf{X}_i' \delta + v_i,$$

where  $M_i$  is the settler mortality rate in 1,000 mean strength. The exclusion restriction is that this variable does not appear in (1).



# AJR (2001)

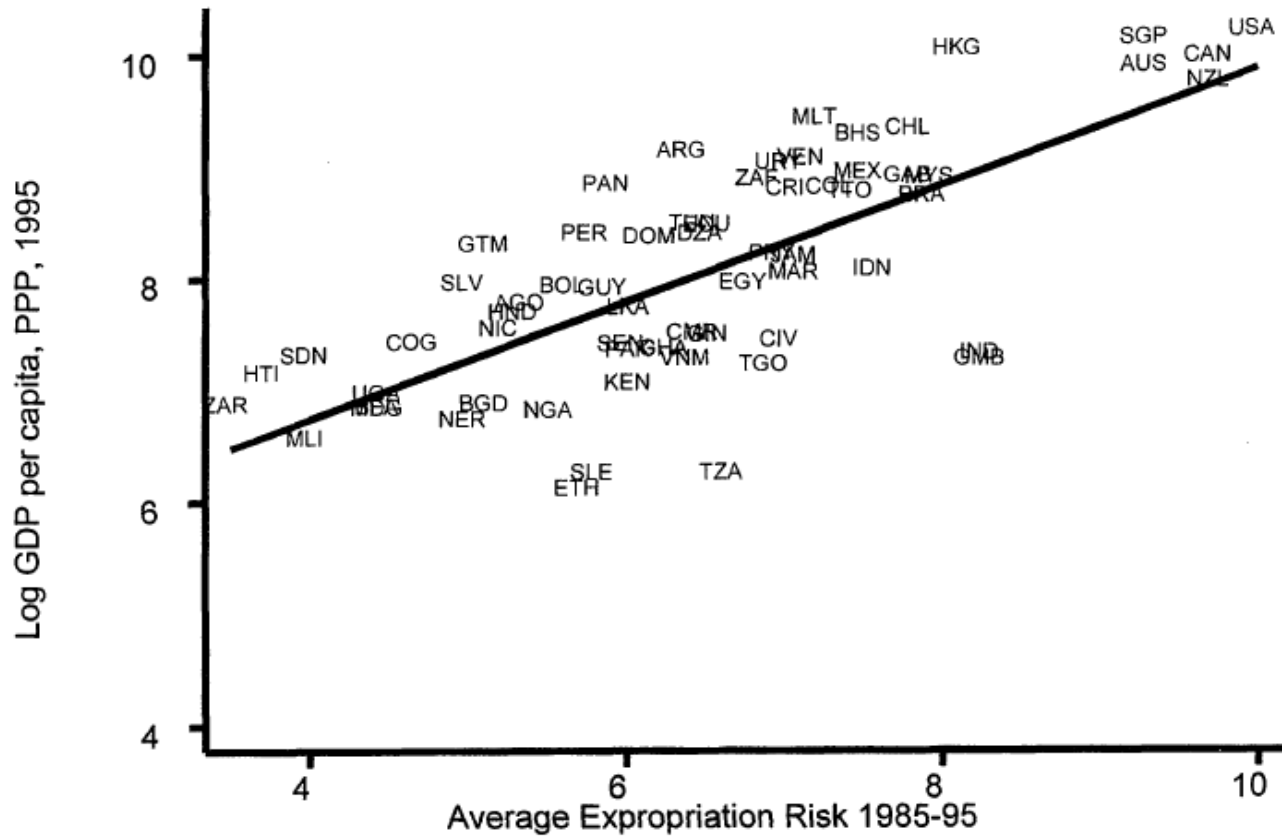


FIGURE 2. OLS RELATIONSHIP BETWEEN EXPROPRIATION RISK AND INCOME

# AJR (2001)

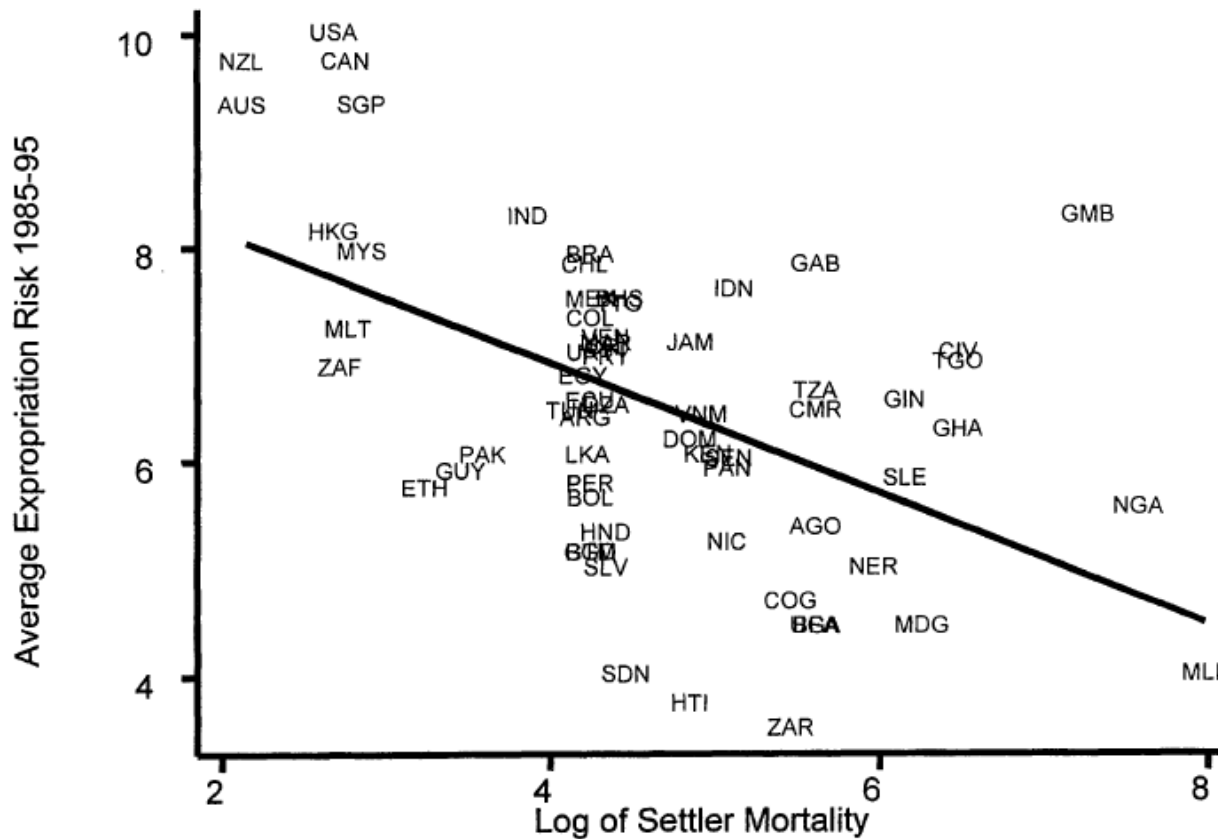


FIGURE 3. FIRST-STAGE RELATIONSHIP BETWEEN SETTLER MORTALITY AND EXPROPRIATION RISK

TABLE 4—IV REGRESSIONS OF LOG GDP PER CAPITA

	Base sample (1)	Base sample (2)	Base sample without Neo-Europes (3)	Base sample without Neo-Europes (4)	Base sample without Africa (5)	Base sample without Africa (6)	Base sample with continent dummies (7)	Base sample with continent dummies (8)	Base sample, dependent variable is log output per worker (9)
Panel A: Two-Stage Least Squares									
Average protection against expropriation risk 1985–1995	0.94 (0.16)	1.00 (0.22)	1.28 (0.36)	1.21 (0.35)	0.58 (0.10)	0.58 (0.12)	0.98 (0.30)	1.10 (0.46)	0.98 (0.17)
Latitude		-0.65 (1.34)		0.94 (1.46)		0.04 (0.84)		-1.20 (1.8)	
Asia dummy							-0.92 (0.40)	-1.10 (0.52)	
Africa dummy							-0.46 (0.36)	-0.44 (0.42)	
“Other” continent dummy							-0.94 (0.85)	-0.99 (1.0)	
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	-0.61 (0.13)	-0.51 (0.14)	-0.39 (0.13)	-0.39 (0.14)	-1.20 (0.22)	-1.10 (0.24)	-0.43 (0.17)	-0.34 (0.18)	-0.63 (0.13)
Latitude		2.00 (1.34)		-0.11 (1.50)		0.99 (1.43)		2.00 (1.40)	
Asia dummy							0.33 (0.49)	0.47 (0.50)	
Africa dummy							-0.27 (0.41)	-0.26 (0.41)	
“Other” continent dummy							1.24 (0.84)	1.1 (0.84)	
R <sup>2</sup>	0.27	0.30	0.13	0.13	0.47	0.47	0.30	0.33	0.28
Panel C: Ordinary Least Squares									
Average protection against expropriation risk 1985–1995	0.52 (0.06)	0.47 (0.06)	0.49 (0.08)	0.47 (0.07)	0.48 (0.07)	0.47 (0.07)	0.42 (0.06)	0.40 (0.06)	0.46 (0.06)
Number of observations	64	64	60	60	37	37	64	64	61

# Other studies

- Dell, M (2014): Path Dependence in Development: Evidence from the Mexican Revolution, mimeo Harvard
  - impact of insurgency on income, labor force, public employees, education
  - Instrumental variable approach in which insurgency is instrumented with severity of drought

$$y_{ms} = \delta_0 + \delta_1 \text{insurgency}_{ms} + X_{ms} \beta + \alpha_s + \mu_{ms}$$

$$\text{COV}(\epsilon_{ms}, \mu_{ms}) = 0$$

$$\text{insurgency}_{ms} = \gamma_0 + \gamma_1 \text{drought}_{ms} + X'_{ms} \beta + \alpha_s + \epsilon_{ms}$$

# Other studies

- Iyer, Lakshmi (2010): Direct versus Indirect Colonial Rule in India: Long-Term Consequences, *The review of Economics and Statistics* 92(4), 693-713
- Effect of direct vs indirect rule of the British empire on various economic outcomes in India
- Problem of endogeneity of direct British rule
- Doctrine of annexation – annex an Indian territory is a ruler died without a natural heir

$$y_i = \alpha + \beta Brit_i + \gamma X_i + \epsilon_i$$

$$cov(\epsilon_i, u_i) = 0$$

$$Brit_i = \pi_0 + \pi_1 Lapse_i + \pi_2 X_i + u_i$$

# Geography and history as a source of exogenous variation

- Assumption of 'exclusion restriction' can't be tested => there is a scope for 'residual' endogeneity
- Geography and history can provide a much 'cleaner' way of estimating a causal impact of institutions on various economic outcomes
- Two papers will be discussed:
  - Basten, C., and Frank Betz (2013): Beyond Work Ethic: Religion, Individual and Political Preferences, American Economic Journal: Economic Policy 5, 67-91
  - Dell, M. (2010): the Persistent Effects of Peru's Mining Mita, Econometrica 78(6), 1863-1903

# BB (2013)

- Examine the effect of Reformed Protestantism (relative to Catholicism) on preferences for leisure, redistribution, and intervention in the economy
- Use data from Switzerland which allows for *within-country* correlation and considerable geographical and institutional variation => concentrate on institutionally homogenous part of South-Western Switzerland (Vaud and Fribourg)
- Argue that Reformation led to exogenous variation in religion

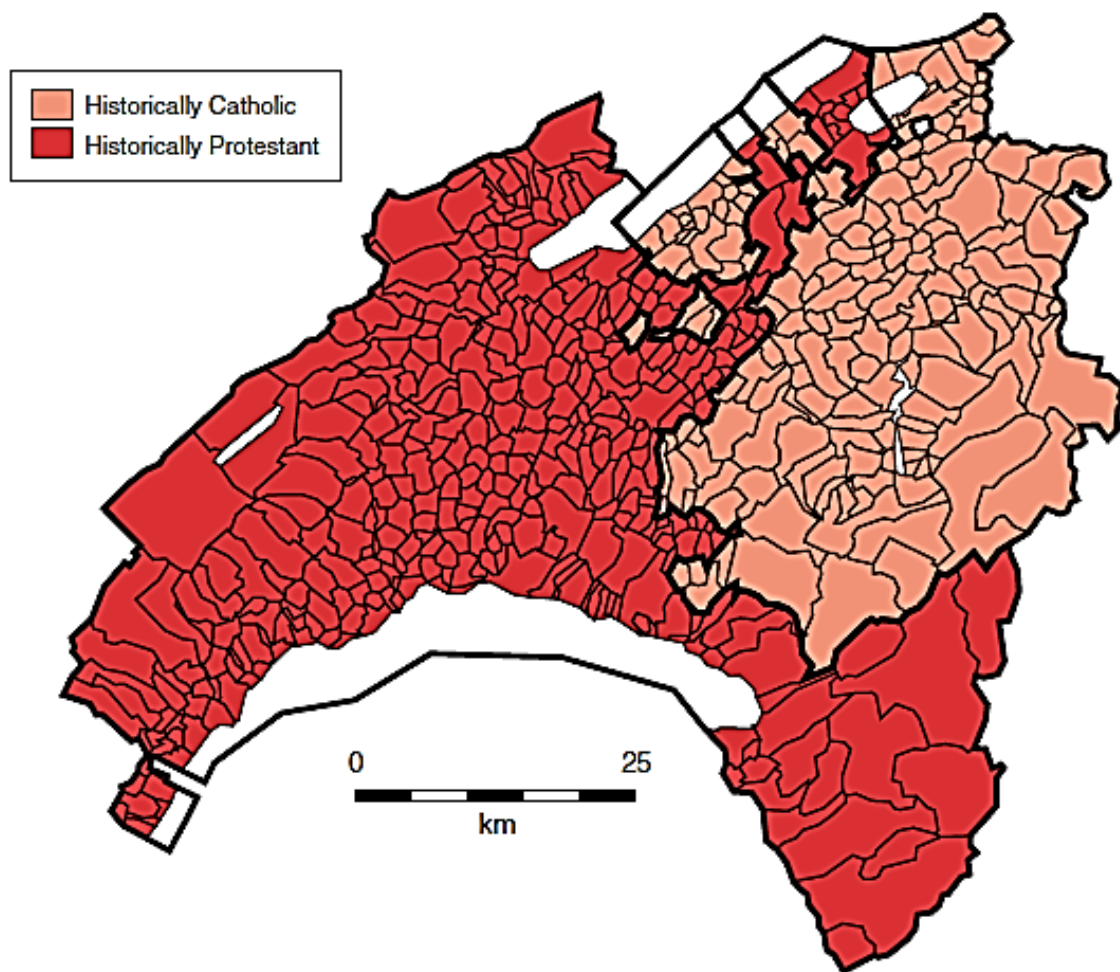


FIGURE 1. CATHOLIC AREA IN THE NORTHEAST, PROTESTANT IN SOUTH AND WEST;  
LAKE GENEVA IS IN THE SOUTH AND LAKE NEUCHATEL IN THE NORTH



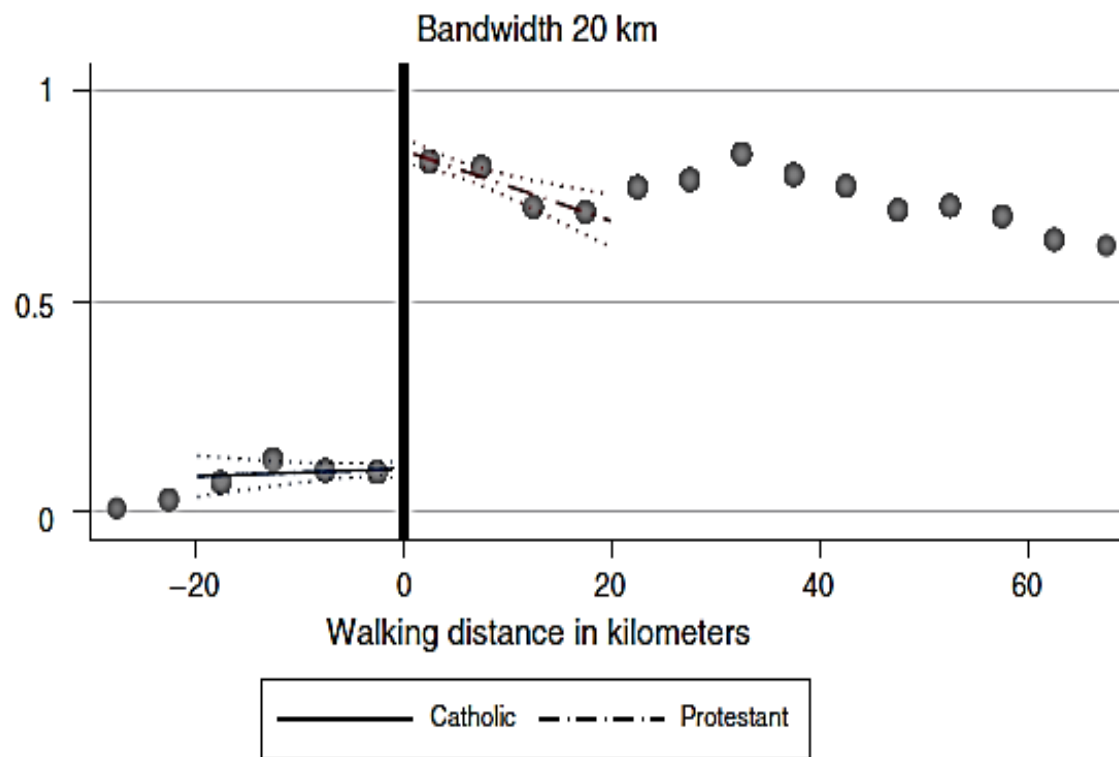
# BB (2013)

- Exogeneity of religion is historically argued:
  - Homogenous until the early 16<sup>th</sup> century
  - Then split into two parts – one belonged to Berne, the other to Fribourg
  - Both imposed different religion: Berne Protestant, Fribourg Catholic
  - Homogeneity of both regions before the adoption of Protestantism is crucial for a valid causal analysis
  - Problem with the main explanatory variable – share of Protestants – changes discontinuously at the historical border between Catholic and Protestant parts
  - At the same time, it is exogenous change, offering us a possible instrument – distance to the historical border

TABLE 1—SUMMARY STATISTICS FOR THE MAIN ESTIMATION SAMPLE

	Protestant			Catholic			Compared	
	Mean	SD	N	Mean	SD	N	Difference	T
Share Protestants 1980	83.25	11.41	84	9.43	5.69	49	73.82	49.63
Share no religious affiliation 1980	2.95	2.73	84	1.73	1.5	49	1.22	3.33
Altitude in <i>m</i>	639.61	113.56	84	642.59	120.23	49	-2.98	-0.14
Fireplaces per square km in 1416	12.29	22.59	136	11.65	15.81	56	0.64	0.22
Preferences for leisure	39.51	5.72	84	48.24	4.77	49	-8.73	-9.44
Preferences for redistribution	39.19	5.03	84	43.05	2.63	49	-3.86	-5.8
Preferences for intervention	47.09	3.37	84	52.64	2.94	49	-5.56	-9.96
Average income (CHF), 1980–2000	47,253.27	5,342.36	84	43,692.71	3,369.17	49	3,560.56	4.71
Gini coefficient 1996	0.37	0.05	84	0.3	0.03	49	0.07	9.28

*Notes:* The table presents the summary statistics for our main estimation sample. This includes all municipalities situated within 5.03 km of the next “border point” (i.e., intercept between a road and the border). Statistics on the number of fireplaces per km<sup>2</sup> in 1416 refer to the entire region, given the smaller sample size in 1416. The difference is also insignificant when we restrict to the 5.03 km bandwidth per side.



IK estimate: 0.67, standard error: 0.03, N: 133

FIGURE 3. SHARE OF PROTESTANTS CONDITIONAL ON WALKING DISTANCE TO THE BORDER, BANDWIDTH 5 KM; PREDICTION FROM LINEAR REGRESSION, INCLUDING 95 PERCENT PREDICTION INTERVAL

TABLE 2—FIRST STAGE RESULTS

	Share of Protestants	Share of Protestants	Share of Protestants
	(1)	(2)	(3)
<i>T</i>	0.67*** (0.03)	0.73*** (0.02)	0.76*** (0.02)
Distance	0.02*** (0.01)	0.00 (0.00)	0.00 (0.00)
<i>T</i> × distance	-0.01 (0.01)	-0.00 (0.00)	-0.01*** (0.00)
Constant	0.13*** (0.02)	0.10*** (0.01)	0.10*** (0.01)
BW	5.01	10	20
Observations	133	208	305

*Notes:* *T* is an indicator for whether a municipality is on the historically Protestant side of the border; “Distance” is walking distance to the closest border point in kilometers. In column 1, bandwidth in kilometers is chosen optimally following Imbens and Kalyanaraman (2012). Columns 2 and 3 use alternative bandwidths of respectively 10 km and 20 km. Robust standard errors in parentheses.

\*\*\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\* Significant at the 10 percent level.

TABLE 4—SECOND STAGE RESULTS

	Preferences for leisure	Preferences for redistribution	Preferences for intervention	Mean income 1980–2000	Income inequality in 1996
	(1)	(2)	(3)	(4)	(5)
Share Protestants	−13.46*** (3.11)	−5.06** (2.13)	−6.49*** (1.71)	4.17* (2.29)	0.13*** (0.03)
Distance	0.44 (0.63)	0.44 (0.35)	−0.16 (0.33)	−0.49 (0.32)	−0.00 (0.00)
$T \times$ distance	−0.36 (0.80)	−0.91 (0.55)	0.01 (0.43)	1.14* (0.60)	−0.01 (0.01)
Constant	50.53*** (1.89)	44.56*** (0.94)	52.87*** (1.05)	42.16*** (1.20)	0.29*** (0.01)
IK OB	5.01	5.01	5.01	5.01	5.01
Observations	133	133	133	133	133

Notes: “Share Protestants” is the share of Protestants amongst those either Protestant or Catholic, as of the 1980 census. The coefficients give the estimated difference between a fully Protestant and a fully Catholic municipality. The share of Protestants is instrumented with  $T$ , an indicator for whether a municipality is on the historically Protestant side of the border; “Distance” is walking distance to the closest border point in kilometers; Bandwidth in kilometers is chosen optimally following Imbens and Kalyanaraman (2012). Preferences in columns 1, 2, and 3 are averages of the individual referenda listed in Table 1 of the online Appendix. Column 4 uses the average across the years 1980–2000 of each municipality’s pre-tax income divided by the number of taxpayers. Column 5 uses the Gini coefficient of income inequality, taken from Ecoplan (2004). Robust standard errors in parentheses.

\*\*\* Significant at the 1 percent level.

\*\* Significant at the 5 percent level.

\* Significant at the 10 percent level.