The Long Shadow of History

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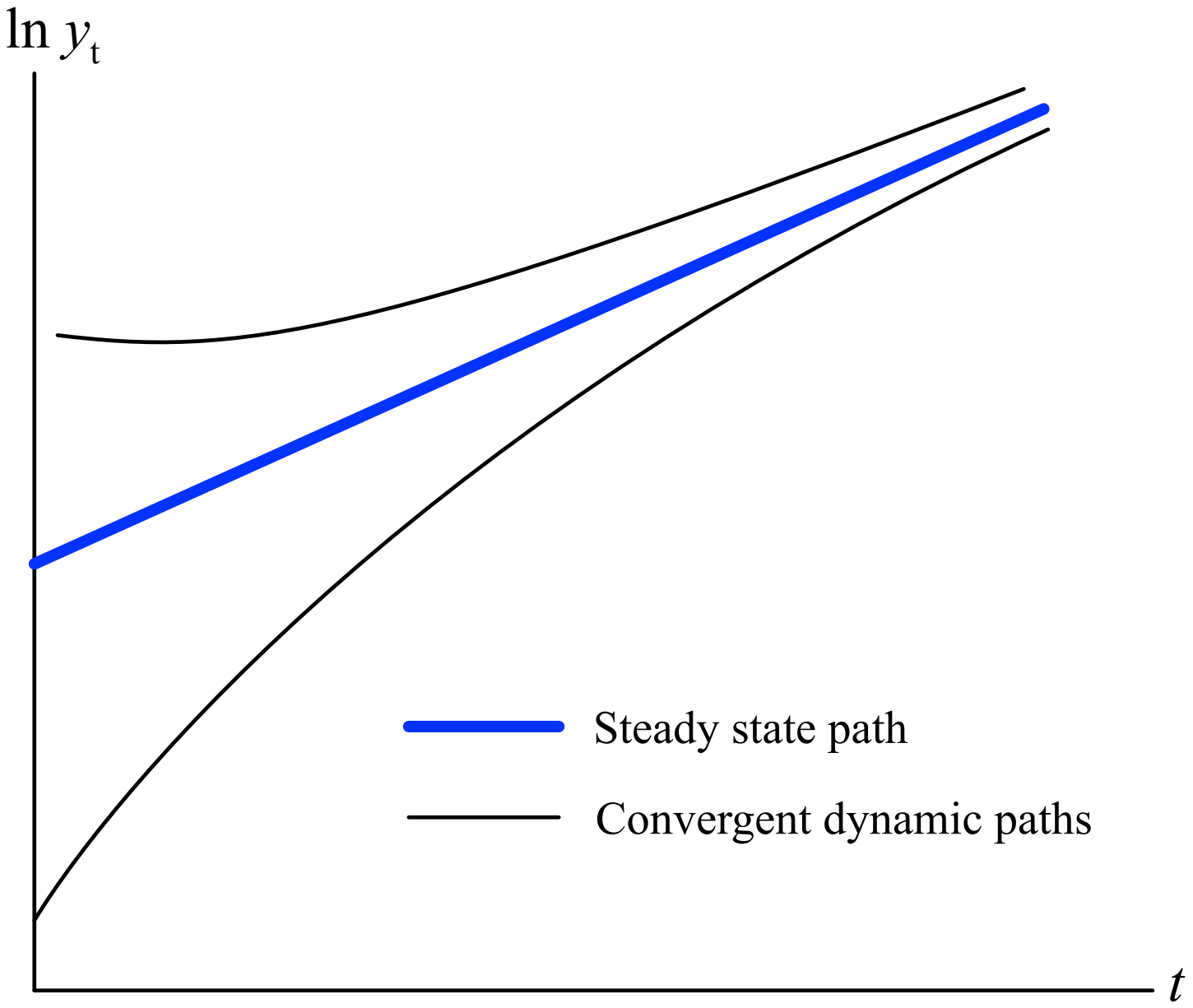
Convergence and Divergence

- If you open a textbook in development economics, it will list the usual problems:

- Low physical capital per person,
- Undernutrition,
- Lack of education,
- Limited access to sanitation, safe water and housing,
- High population growth rates,
- High infant mortality rates, etc.

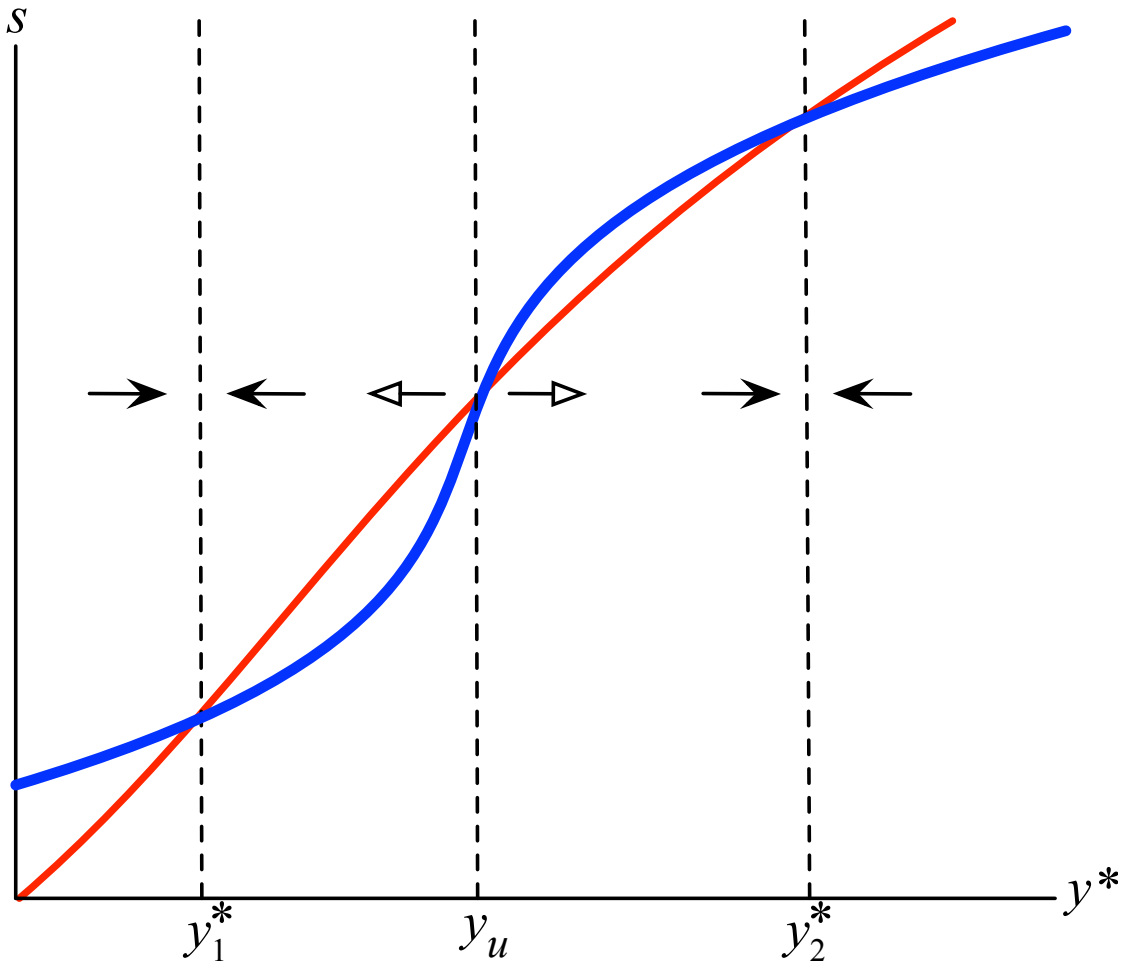
- Some are *characteristics* of underdevelopment.
- Others one step removed. Often serve as "explanations".
- Enormous empirical literature spawned on these "explanations".
- E.g., regress g on "exogenous" factors: s or n, initial y or h.
- Fundamental notion is convergence (Solow, turnpike).
- Diminishing returns $\Rightarrow$ poorer countries grow faster, catch up, converge.
- Look for convergence "conditional" on all the "exogenous" factors.


ln y_t
Steady state path
Convergent dynamic paths
t

The Influence of Convergence

- Limits our focus to *parameters* rather than *processes*. E.g.,
  - one country is more corrupt than another,
  - or less democratic,
  - or has a horrible work ethic,
  - or its citizens reproduce like rabbits,
  - or is predisposed not to save . . .
- ~~parameters~~ $\longrightarrow$ ~~economic outcomes~~
  - endogenous variable $\longrightarrow$ economic outcomes $\longrightarrow$ endogenous variable

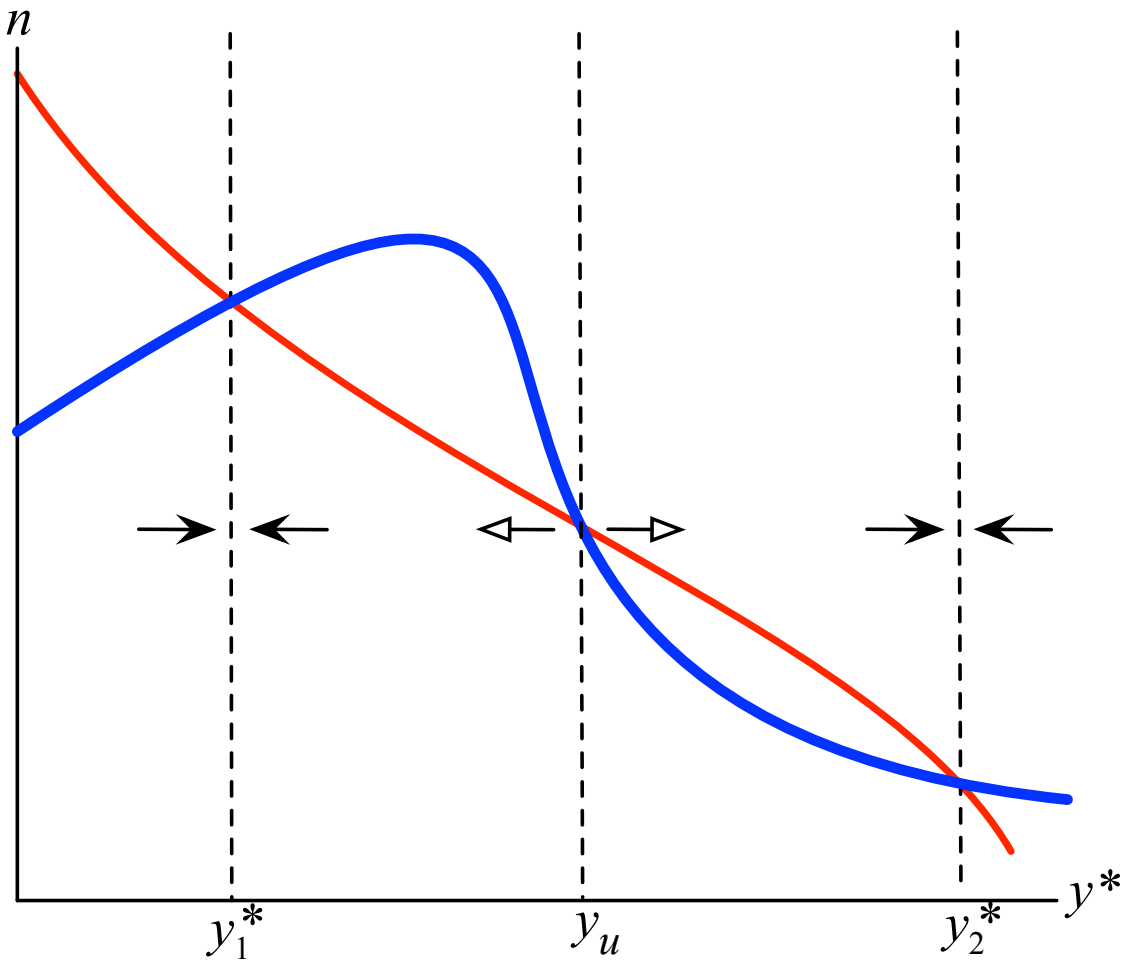
Example: The Endogeneity of s



Blue line: How s is affected by steady state income y^*.

Red line: How y^* is determined by s (as in Solow model).

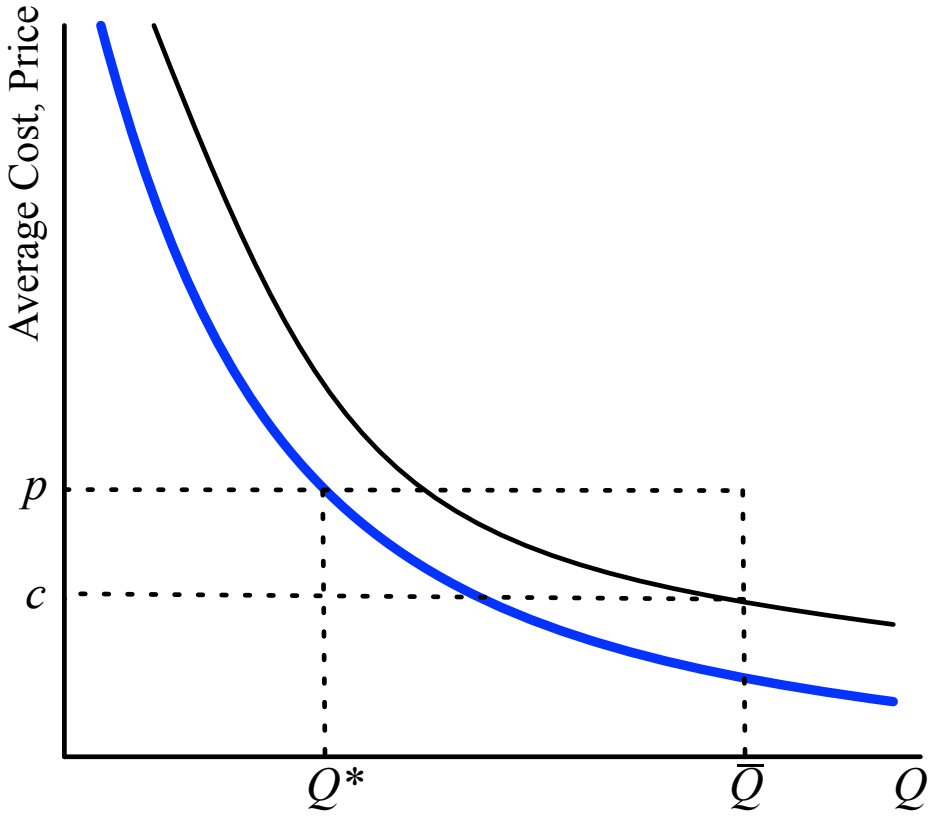
Example: The Endogeneity of n

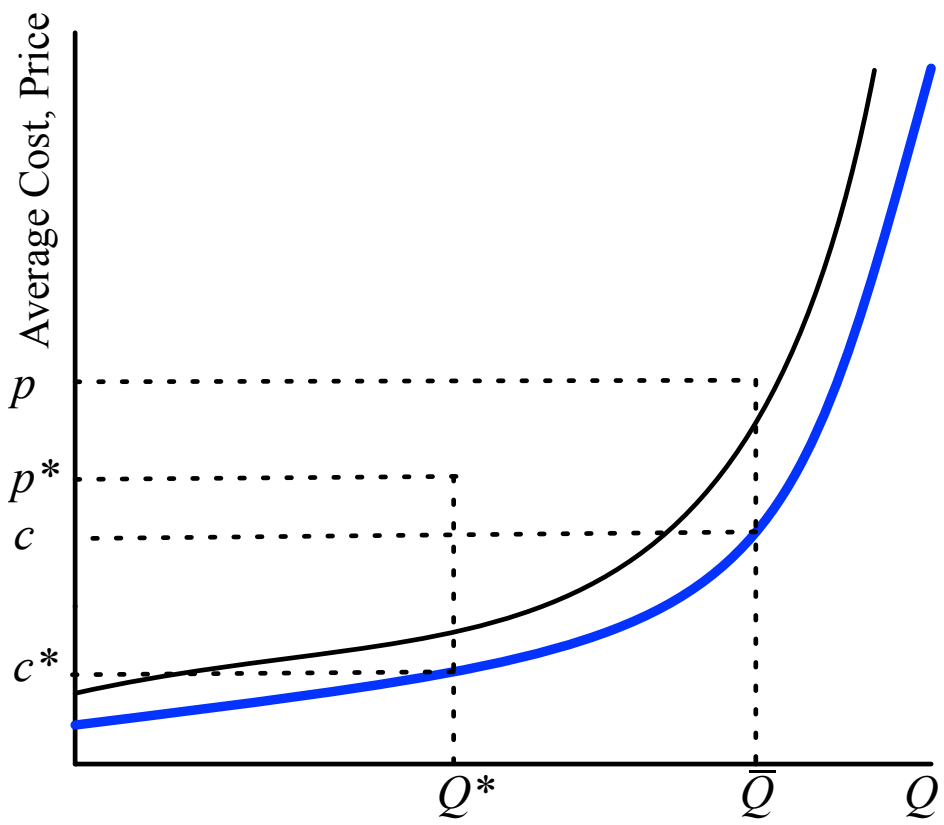


Blue line: How n is affected by steady state income y^*.

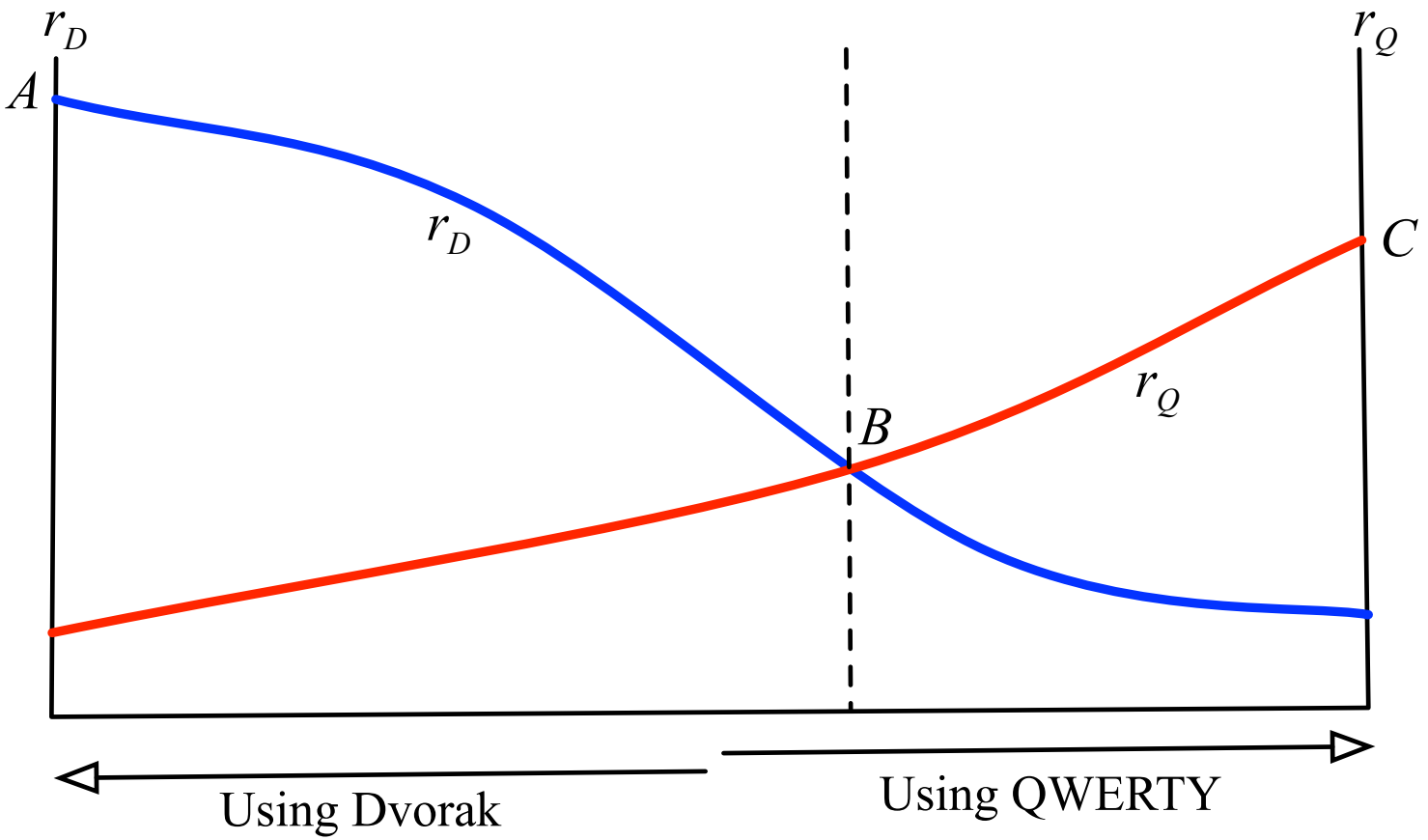
Red line: How y^* is determined by n (as in Solow model).

Example: Increasing Returns and Entry





Example: QWERTY



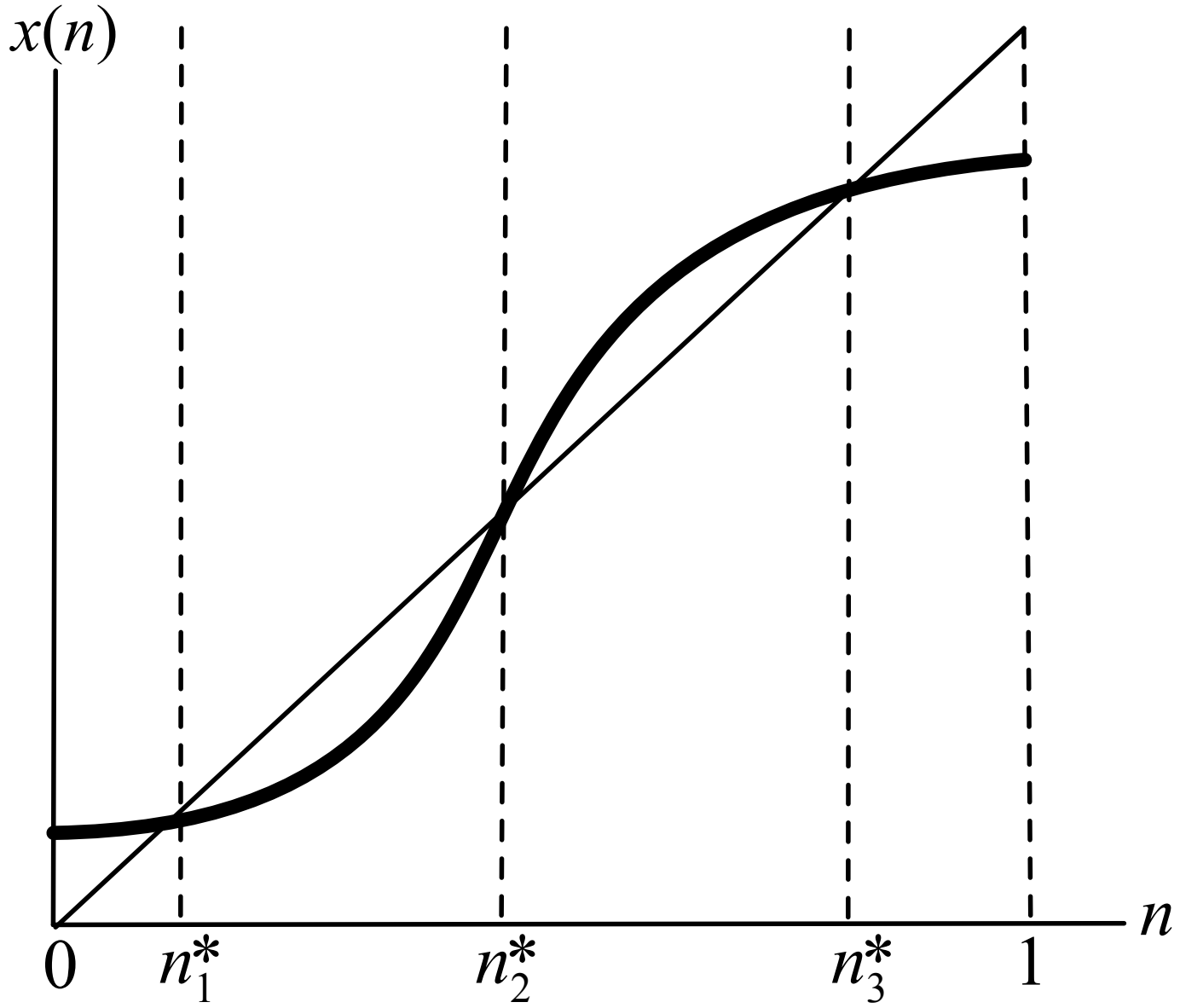
Complementarities

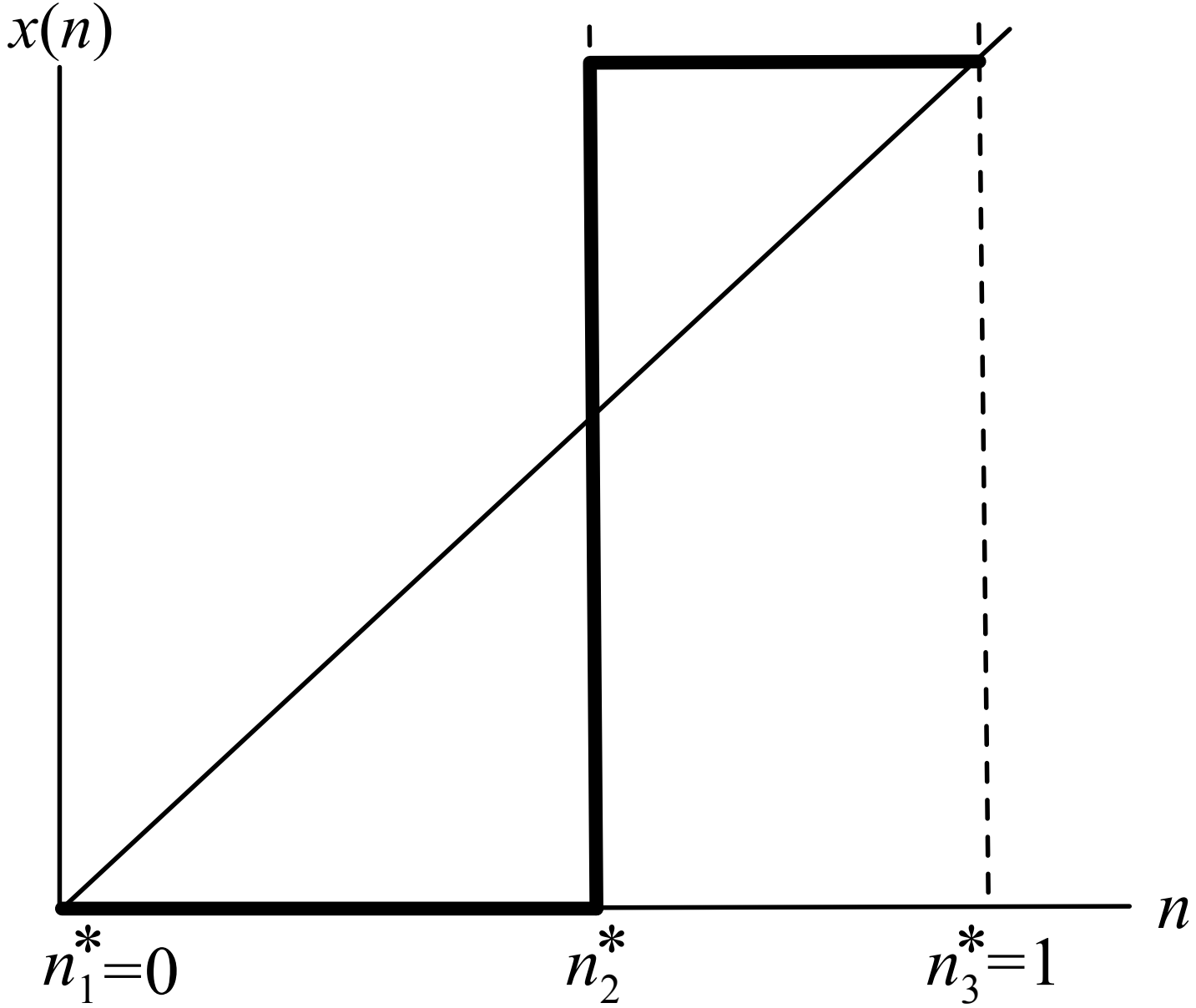
- Action $\Rightarrow$ Action
- Technology. Macs vs PCs.
- Network externalities.
- Infrastructure. Public sector covers fixed and variable cost:
- $p(n) = v + (F/n)$.
- Finance. Thicker financial market $\Rightarrow$ higher diversification.
- $\Rightarrow$ Easier for individual to invest $\Rightarrow$ thicker market.
- Social Capital. Mobility destroys traditional social networks.
- All sorts of effects including a mobility feedback.

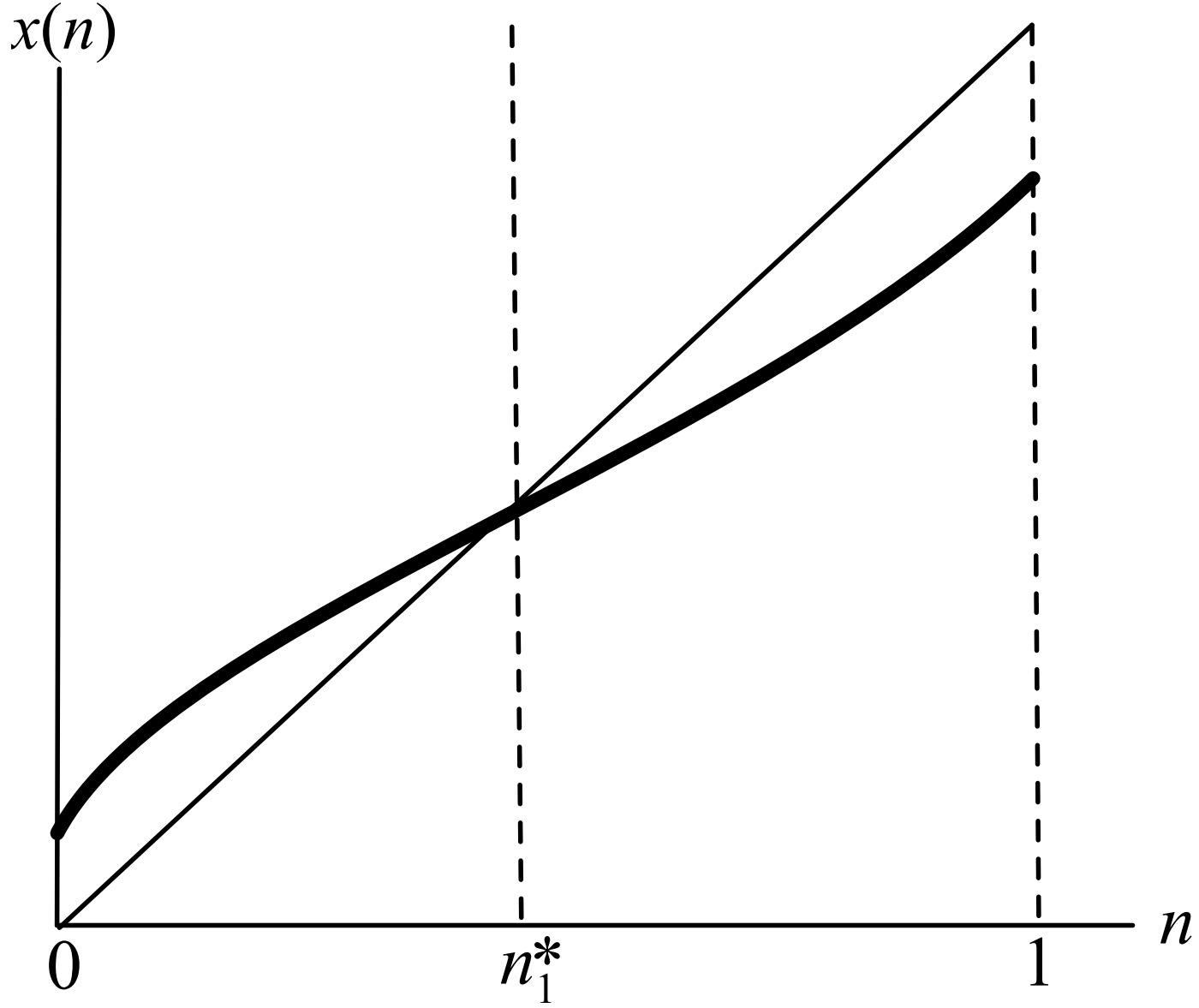
- Corruption.
  - Cap on how many “corrupt” people can be investigated.
- Norms
  - Throwing garbage in public spaces
  - The use of contraceptives
  - Waiting one’s turn
- Currency Crises
  - Herding versus the fundamentals.
- Revolutions
  - Probability of victory determined by participation

Two Defining Features of History Dependence

- State variables:
  - capital stock, savings rate, fertility, inequality
  - (less tangible) norms, expectations
  - these are what gives history its "stickiness."
- The complementarity map:
  - Mapping from state variable to state variable
  - Its slope signals possible multiplicities or history-dependence
  - "Intersections with the diagonal" represent steady states.


x(n)
n
0
n*1
n*2
n*3
1


x(n)
n
n*1=0
n*2
n*3=1


x(n)
n
0
n*1
1

The Long Shadows Cast by History

- Institutions in general
- In particular:
  - Origins of property rights
  - Early technologies
  - Slavery
  - Colonial rent collection

Institutions

- *Institutions*: Ambient rules (formal or informal) for conducting economic, social and political transactions.

- E.g., institutions that protect property rights (law enforcement)

- Or provide old age pensions (social security)

- Or provide insurance against a banking crisis (FDIC)

- Or enable financial holdings in companies (the stock market)

- Or guarantee that contracts will be upheld (courts)

- Or oversee safe and fair elections (Electoral Commissions)

- Or norms of reciprocity and sanctions (informal).

- Good economic institutions promote investment and growth

- But institution creation is deeply conditioned by history

- Indeed, bad institutions (such as autocracies) may self-generate or generate worse institutions (dictatorships) as the beneficiaries struggle to keep their benefits.

- Sokoloff and Engerman (JEP 2000) argue that this lies at the difference between North and South America:

- Initially: "Voltaire, for example, considered the conflict in North America between the French and the British during the Seven Years War (1756-63) to be madness and characterized the two countries as 'fighting over a few acres of snow.' The victorious British were later to engage in a lively public debate over which territory should be taken from the French as reparations — the Caribbean island of Guadeloupe (with a land area of 563 square miles) or Canada."

- South America: Huge mineral riches, lots of native labor

- Extractive economies (mine rights, tribute-taking, etc.).

- Or plantation economies which used slave labor; again, relatively few large landowners.

- Rights assigned in controlled, restricted way.

- E.g. strict restrictions on migration to the New World.

- $\Rightarrow$ unequally situated elite, which tried to hold on to power.

- Restrictions on commerce and political participation; e.g., need to own substantial land in order to vote.

- North America: US and Canada

- No large amounts of native labor

- No appropriate climate for sugar except in the South (but even here, size of sugar plantations relatively small)

- Laborers of European descent, equality in human capital

- Relatively small landholdings, open immigration

- Hard to create institutions with unequal political power.

- Even though voting restricted at the beginning, franchise was rapidly extended.

- Sokoloff and Engermann conclude:

"These early differences in the extent of inequality across New World economies may have been preserved by the types of economic institutions that evolved and by the effects of those institutions on how broadly access to economic opportunities was shared. This path of institutional development may in turn have affected growth. Where there was extreme inequality, and institutions advantaged elites and limited the access of much of the population to economic opportunities, members of elites were better able to maintain their elite status over time, but at the cost of society not realizing the full economic potential of disadvantaged groups . . . [S]uch biases in the paths of institutional development likely go far in explaining the persistence of inequality over the long run in Latin America and elsewhere in the New World."

Testing for the Long Shadow of Institutions

Acemoglu, Johnson and Robinson (2001)

- Main problem: institutions are endogenous to development.
- So how to establish causality?
- Three severe problems of endogeneity:
- Richer countries can afford better institutions
- Omitted variables
- Bias in dataset: perceiving better institutions in richer countries

A Detour: Instrumental Variables

- Example 1: Schooling and Earnings (Angrist and Kreuger 1991)

- Imagine we want the effect of schooling on wages, and regress

$$y_i = C + b_1 s_i + \epsilon_i$$

where y_i is earnings (typically log wages) and s_i is years of schooling.

- Problem: there is an omitted variable we do not measure: "ability."

- The "true" regression is

$$y_i = C + b_1 s_i + b_2 a_i + \epsilon_i$$

but we can't run this regression because we don't see a_i!

- Example 2: Poverty and Conflict (Miguel, Satyanath and Sergenti 2004)

- We want to know if low incomes cause conflict, and regress

$$c_i = A + by_i + \epsilon_i$$

where c_i is conflict incidence and y_i is per-capita income.

- Problem: there is reverse causality. Conflict can affect income.

- Example 3: Measurement Error

- We think we're regressing y on x, but we're *really* running is

$$y_i = A + b[x_i + m_i] + \epsilon_i$$

- because there is measurement error m_i when measuring x_i.

- In all cases, a classic endogeneity problem:

- Explanatory variable is correlated with the error term, and biases b.

Instruments

- A magic variable z that satisfies two conditions:

(i) z is correlated with the explanatory variable x.

- You can run a separate regression (the "first stage") to show this is statistically true.

(ii) z is uncorrelated (except via x) with the dependent variable y.

- That is, z is uncorrelated with the error term ϵ: exclusion restriction.

- You *cannot* show this statistically. You have make the argument by appealing to "theory."

Application: Birthdays and Schooling

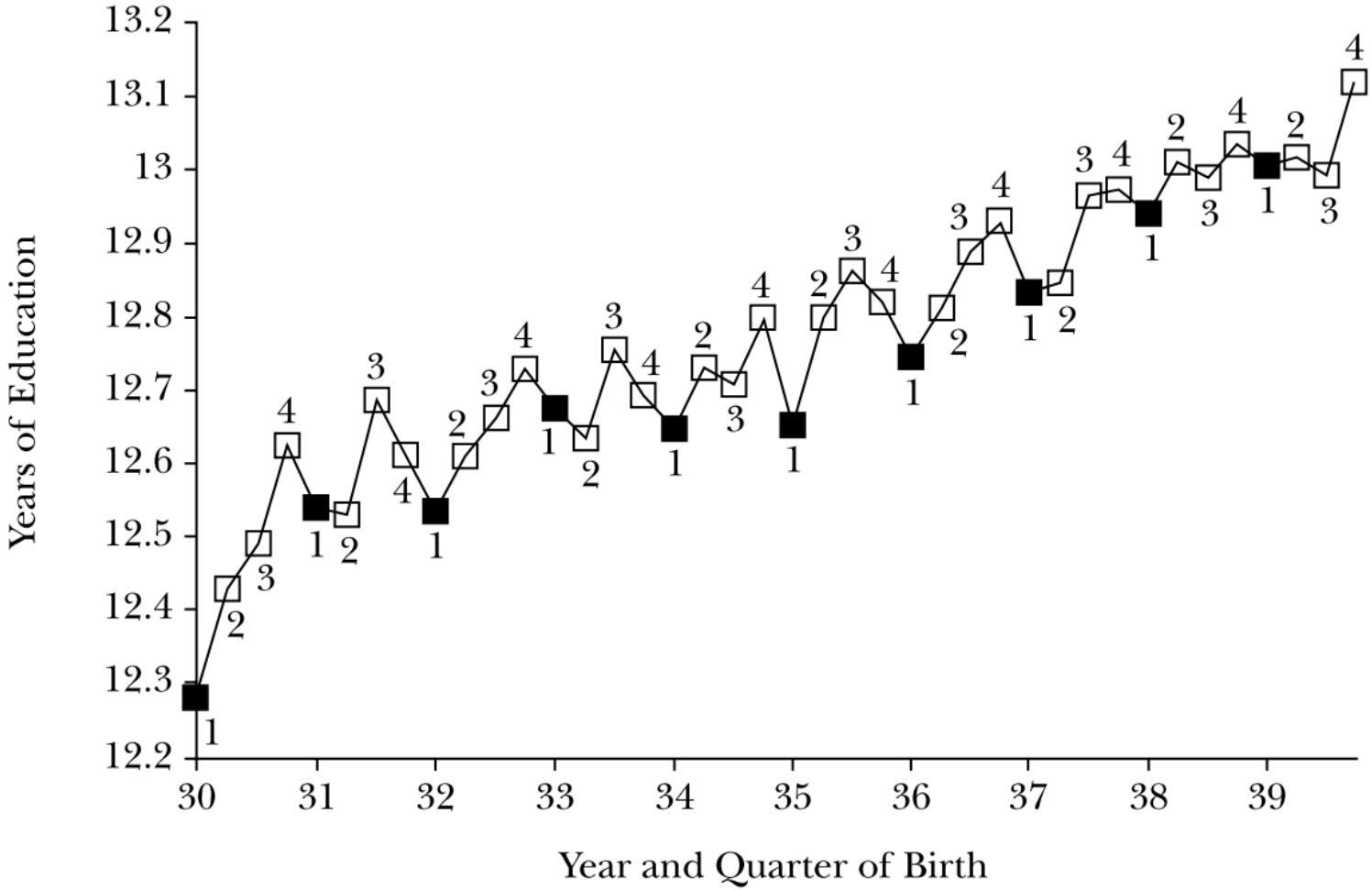
Angrist and Krueger 1991, 2001

- In the US, you start school in the year you turn 6.
- Someone born in December 2000 can go to school a year earlier than someone born in January 2001.
- So those born in a later calendar quarter start school early.
- In addition, there is the compulsory schooling law:
- You must stay in school until you turn 16.
- On average, this gives late-quarter individuals more years of schooling.
- Is quarter of birth usable as an instrument for education?

Birthdays and Schooling, contd.

Figure 1

Mean Years of Completed Education, by Quarter of Birth

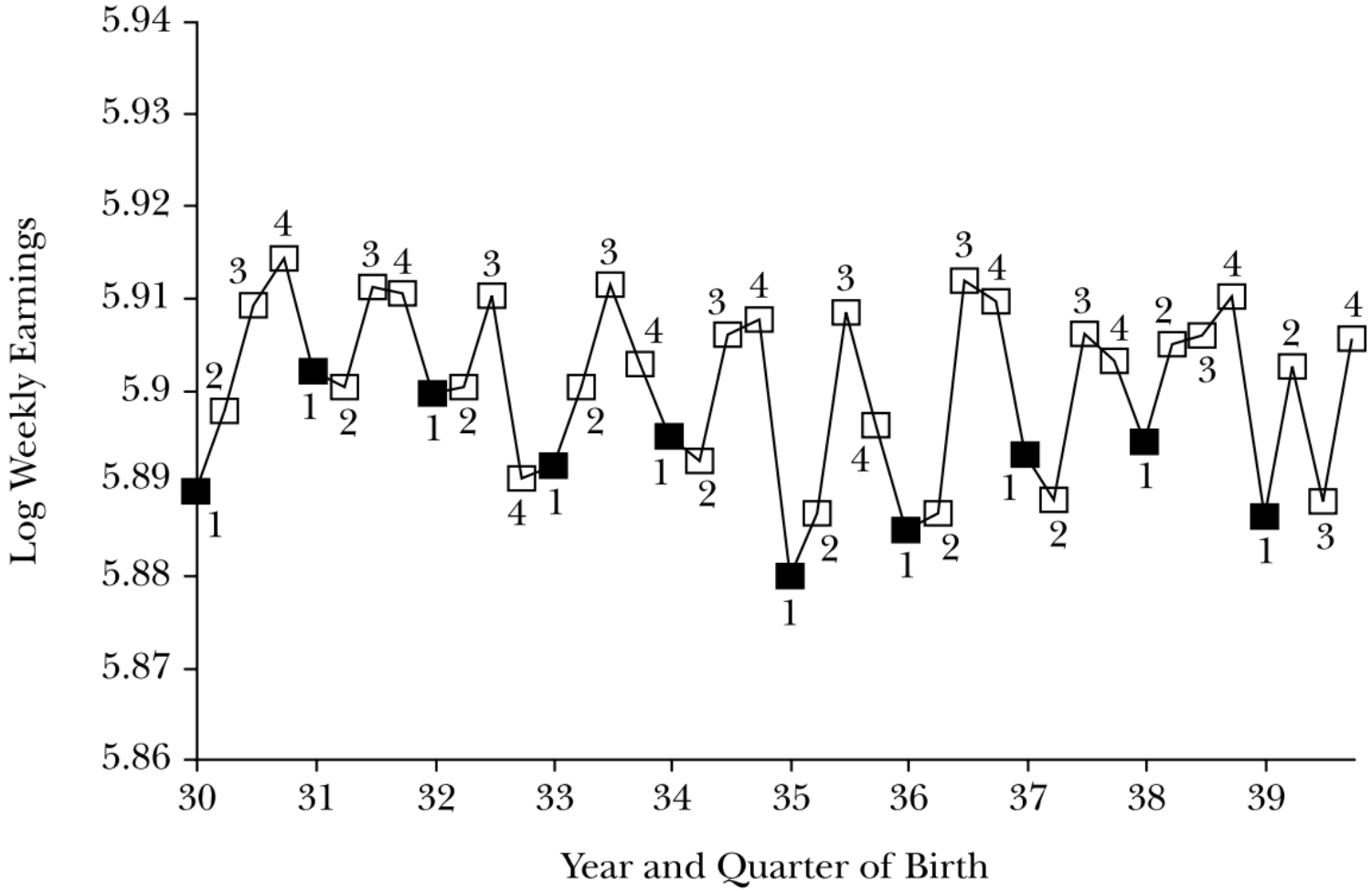


Source: Authors' calculations from the 1980 Census.

Birthdays and Schooling, contd.

Figure 2

Mean Log Weekly Earnings, by Quarter of Birth



Source: Authors' calculations from the 1980 Census.

- Angrist-Krueger study men born from 1930 to 1959 (1980 US census).

- From Angrist and Krueger 2001:

"The intuition behind instrumental variables in this case is that differences in earnings by quarter of birth are assumed to be accounted for solely by differences in schooling by quarter of birth, so that the estimated return to schooling is simply the appropriately rescaled difference in average earnings by quarter of birth. Only a small part of the variability in schooling — the part associated with quarter of birth — is used to identify the return to education."

- Other possible instruments in this context:

- School availability (Duflo 1998 Indonesia, Bedi-Gaston 1999 Honduras)

- Distance to the nearest high school (Maluccio 1997 Philippines)

- Change in compulsory schooling age (Harmon and Walker 1995 UK)

- Do you think these are good instruments? Why or why not?

Procedure: Two-Stage Least Squares (2SLS)

- First Stage: regress x on the instrument(s) z.

- Make sure to include any controls to be used in predicting y, here in the first stage as well.

- Second Stage: run the regression you originally wanted, except . . .

- . . . use the *predicted* or fitted values $\hat{x}$ from the First Stage.

- In effect, what is done is this: we make use of the variation of x that is due to variation in the instruments, using all available right-hand-side variables, not just any one. That collapses everything neatly into a "single instrument" $\hat{x}$, which is used in the second stage.

- Back to Acemoglu-Johnson-Robinson.
- Their measure of institutions: "protection against expropriation."
- *Political Risk Services* publishes this data.
- One could argue that this is a very narrow measure, but anyway ...
- The regression:

$$y_i = C + \beta R_i + \mathbf{X_i'b} + \epsilon_i$$

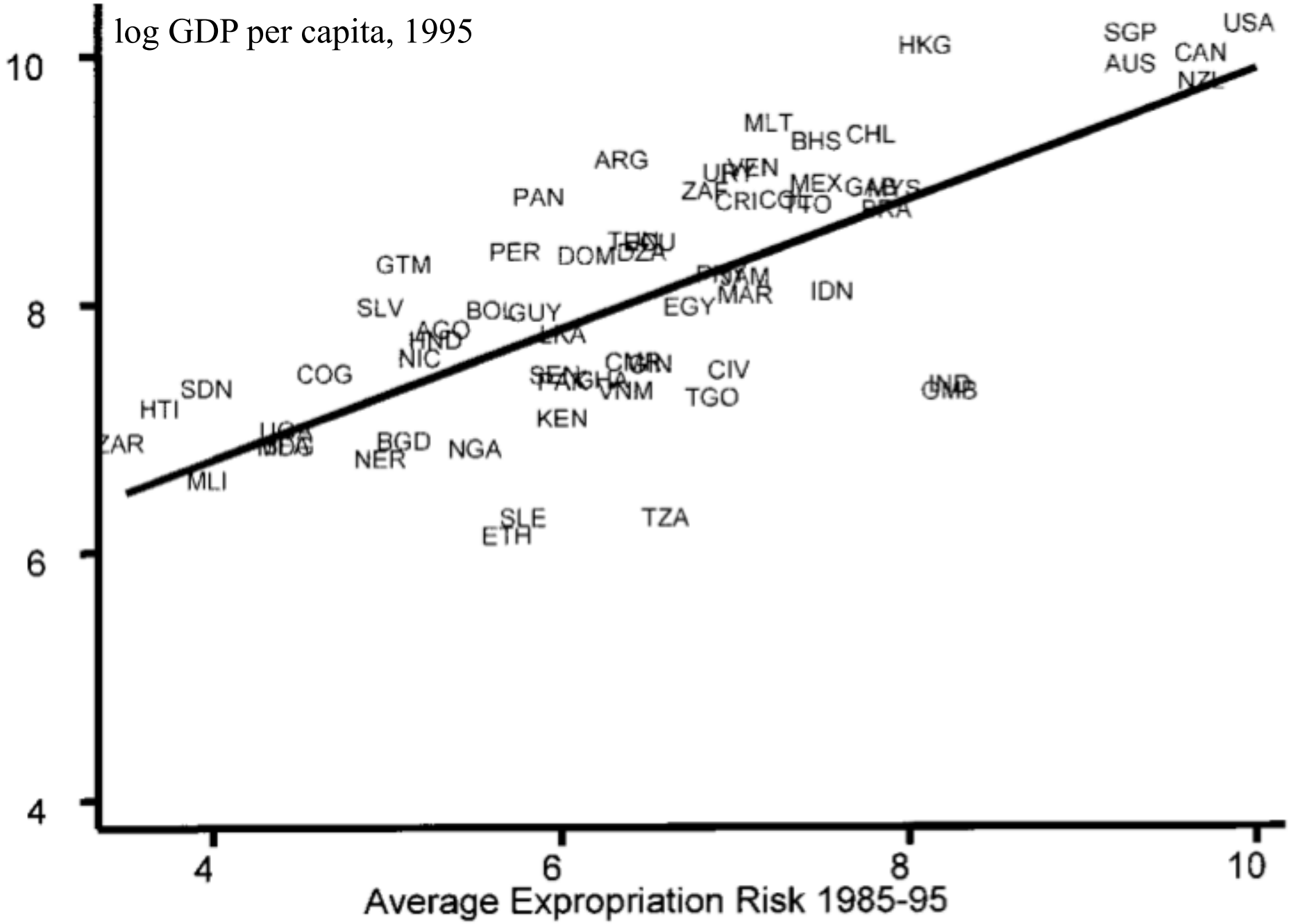
where:

- y_i is log per-capita GDP
- R_i is "protection against expropriation"
- X is a vector of country characteristics (latitude, regional membership).

TABLE 2—OLS REGRESSIONS

	Whole world (1)	Base sample (2)	Whole world (3)	Whole world (4)	Base sample (5)	Base sample (6)	Whole world (7)	Base sample (8)
	Dependent variable is log GDP per capita in 1995						Dependent variable is log output per worker in 1988	
Average protection against expropriation risk, 1985–1995	0.54 (0.04)	0.52 (0.06)	0.47 (0.06)	0.43 (0.05)	0.47 (0.06)	0.41 (0.06)	0.45 (0.04)	0.46 (0.06)
Latitude			0.89 (0.49)	0.37 (0.51)	1.60 (0.70)	0.92 (0.63)		
Asia dummy				−0.62 (0.19)		−0.60 (0.23)		
Africa dummy				−1.00 (0.15)		−0.90 (0.17)		
"Other" continent dummy				−0.25 (0.20)		−0.04 (0.32)		
R^2	0.62	0.54	0.63	0.73	0.56	0.69	0.55	0.49
Number of observations	110	64	110	110	64	64	108	61

Notes: Dependent variable: columns (1)–(6), log GDP per capita (PPP basis) in 1995, current prices (from the World Bank's World Development Indicators 1999); columns (7)–(8), log output per worker in 1988 from Hall and Jones (1999). Average protection against expropriation risk is measured on a scale from 0 to 10, where a higher score means more protection against expropriation, averaged over 1985 to 1995, from Political Risk Services. Standard errors are in parentheses. In regressions with continent dummies, the dummy for America is omitted. See Appendix Table A1 for more detailed variable definitions and sources. Of the countries in our base sample, Hall and Jones do not report output per worker in the Bahamas, Ethiopia, and Vietnam.


log GDP per capita, 1995
10
8
6
4
HKG
SGP
AUS
USA
CAN
NZL
MLT
BHS
CHL
ARG
PAN
MEX
PER
DOM
GTM
SLV
EGY
MAR
IDN
SDN
HTI
COG
NIC
CIV
TGO
KEN
BGD
NGA
NER
MLI
SLE
ETH
TZA
4
6
8
10
Average Expropriation Risk 1985-95

Endogeneity

- This regression is a perfect candidate to illustrate endogeneity.

- Richer countries will have more protection from expropriation (reverse causation)

- Variables such as legal heritage could drive both GDP and protection from expropriation (omitted variables)

- "Protection from expropriation" probably measured with a great deal of noise, especially in developing countries (measurement error)

- Proposed instrument built from the logical chain:

- (potential) settler mortality $\Rightarrow$ settlements $\Rightarrow$ early institutions $\Rightarrow$ current institutions $\Rightarrow$ current performance.

- Use mortality rates of soldiers, bishops, and sailors in the colonies.

	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	1.00	1.28	1.21	0.58	0.58	0.98	1.10	0.98
	(0.16)	(0.22)	(0.36)	(0.35)	(0.10)	(0.12)	(0.30)	(0.46)	(0.17)
Latitude		−0.65		0.94		0.04		−1.20	
		(1.34)		(1.46)		(0.84)		(1.8)	
Asia dummy							−0.92	−1.10	
							(0.40)	(0.52)	
Africa dummy							−0.46	−0.44	
							(0.36)	(0.42)	
"Other" continent dummy							−0.94	−0.99	
							(0.85)	(1.0)	
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.61	−0.51	−0.39	−0.39	−1.20	−1.10	−0.43	−0.34	−0.63
	(0.13)	(0.14)	(0.13)	(0.14)	(0.22)	(0.24)	(0.17)	(0.18)	(0.13)
Latitude		2.00		−0.11		0.99		2.00	
		(1.34)		(1.50)		(1.43)		(1.40)	
Asia dummy							0.33	0.47	
							(0.49)	(0.50)	
Africa dummy							−0.27	−0.26	
							(0.41)	(0.41)	
"Other" continent dummy							1.24	1.1	
							(0.84)	(0.84)	
R^2	0.27	0.30	0.13	0.13	0.47	0.47	0.30	0.33	0.28

- What sort of magnitude are we talking about?

- Compare two "typical countries with high and low expropriation risk, Nigeria and Chile.

- The 2SLS estimate, 0.94, translates the 2.24 difference in expropriation risk into 206 log points, a 7-times difference. So large, but not implausible.

- Is the instrument believable?

- Exclusion restriction will fail if the instrument has a separate effect on GDP per capita today through another channel.

- One obvious culprit is the disease environment.

- Malaria comes particularly to mind.

	Instrumenting only for average protection against expropriation risk						Instrumenting for all right-hand-side variables			Yellow fever instrument for average protection against expropriation risk	
Panel A: Two-Stage Least Squares											
Average protection against expropriation risk, 1985–1995	0.69	0.72	0.63	0.68	0.55	0.56	0.69	0.74	0.68	0.91	0.90
	(0.25)	(0.30)	(0.28)	(0.34)	(0.24)	(0.31)	(0.26)	(0.24)	(0.23)	(0.24)	(0.32)
Latitude		−0.57		−0.53		−0.1					
		(1.04)		(0.97)		(0.95)					
Malaria in 1994	−0.57	−0.60					−0.62				
	(0.47)	(0.47)					(0.68)				
Life expectancy			0.03	0.03				0.02			
			(0.02)	(0.02)				(0.02)			
Infant mortality					−0.01	−0.01			−0.01		
					(0.005)	(0.006)			(0.01)		
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995											
Log European settler mortality	−0.42	−0.38	−0.34	−0.30	−0.36	−0.29	−0.41	−0.40	−0.40		
	(0.19)	(0.19)	(0.17)	(0.18)	(0.18)	(0.19)	(0.17)	(0.17)	(0.17)		
Latitude		1.70		1.10		1.60	−0.81	−0.84	−0.84		
		(1.40)		(1.40)		(1.40)	(1.80)	(1.80)	(1.80)		
Malaria in 1994	−0.79	−0.65									
	(0.54)	(0.55)									
Life expectancy			0.05	0.04							
			(0.02)	(0.02)							
Infant mortality					−0.01	−0.01					
					(0.01)	(0.01)					
Mean temperature							−0.12	−0.12	−0.12		
							(0.05)	(0.05)	(0.05)		
Distance from coast							0.57	0.55	0.55		
							(0.51)	(0.52)	(0.52)		
Yellow fever dummy										−1.10	−0.81
										(0.41)	(0.38)
R^2	0.3	0.31	0.34	0.35	0.32	0.34	0.37	0.36	0.36	0.10	0.32

Long Shadows: The Plough Alesina-Giuliano-Nunn *QJE* 2013

- Tests the famous hypothesis of Esther Boserup:
- Modern gender roles and norms depend on traditional agricultural practices.
- Specifically, shifting cultivation versus the use of the plough.
- Latter requires greater body strength, favors men. (Also less need for weeding.)

TRADITIONAL PLOUGH USE AND FEMALE PARTICIPATION IN PRE-INDUSTRIAL AGRICULTURE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Dependent variable: Traditional participation of females relative to males in the following tasks:						
	Overall agriculture		Land clearance	Soil preparation	Planting	Crop tending	Harvesting
Mean of dep. var.	3.04	2.83	1.45	2.15	2.86	3.16	3.23
Traditional plough agriculture	−0.883***	−1.136***	−0.434**	−1.182***	−1.290***	−1.188***	−0.954***
	(0.225)	(0.240)	(0.197)	(0.320)	(0.306)	(0.351)	(0.271)
Ethnographic controls	yes	yes	yes	yes	yes	yes	yes
Observations	660	124	129	124	131	122	131
Adjusted R-squared	0.13	0.19	0.14	0.10	0.09	0.13	0.16
R-squared	0.14	0.23	0.18	0.14	0.13	0.18	0.20

"Societies characterized by plough agriculture, and the resulting gender-based division of labor, developed the belief that the natural place for women is within the home. *These cultural beliefs tend to persist even if the economy moves out of agriculture*, affecting the participation of women in activities performed outside the home, such as market employment, entrepreneurship, or participation in politics."

Alesina-Giuliano-Nunn 2013, emphasis mine.

- Obvious strategy: regress gender norms today on earlier use of plough.

- Can be easily done, as we have pre-historical data on plough use, as well as modern surveys of gender roles as well as female participation in the labor force.

Data

- Pre-industrial plough use:

- Murdock's *Ethnographic Atlas*, data on 1265 ethnic groups.

- Contains data on plough use for 1156 ethnicities, mainly before 1950.

- 997: plough absent, 141: plough present and aboriginal, 18: adopted after European contact.

- Various controls:

- *Historical*: Use of domesticated animals, population density, jurisdictional hierarchies, group location

- *Contemporary*: per-capita GDP

Data, contd.

- Matching present to past; combine:
  - *Ethnologue*: Current geographical distribution of 7.612 living languages.
  - Connect these to ethnic groups in Murdock's Atlas.
  - *Landscan*: Population estimates by small grid cells.
  - Average these to create ancestral plough use by district or country.
- Measure of female gender roles today:
  - labor force participation
  - firm ownership
  - participation in national politics

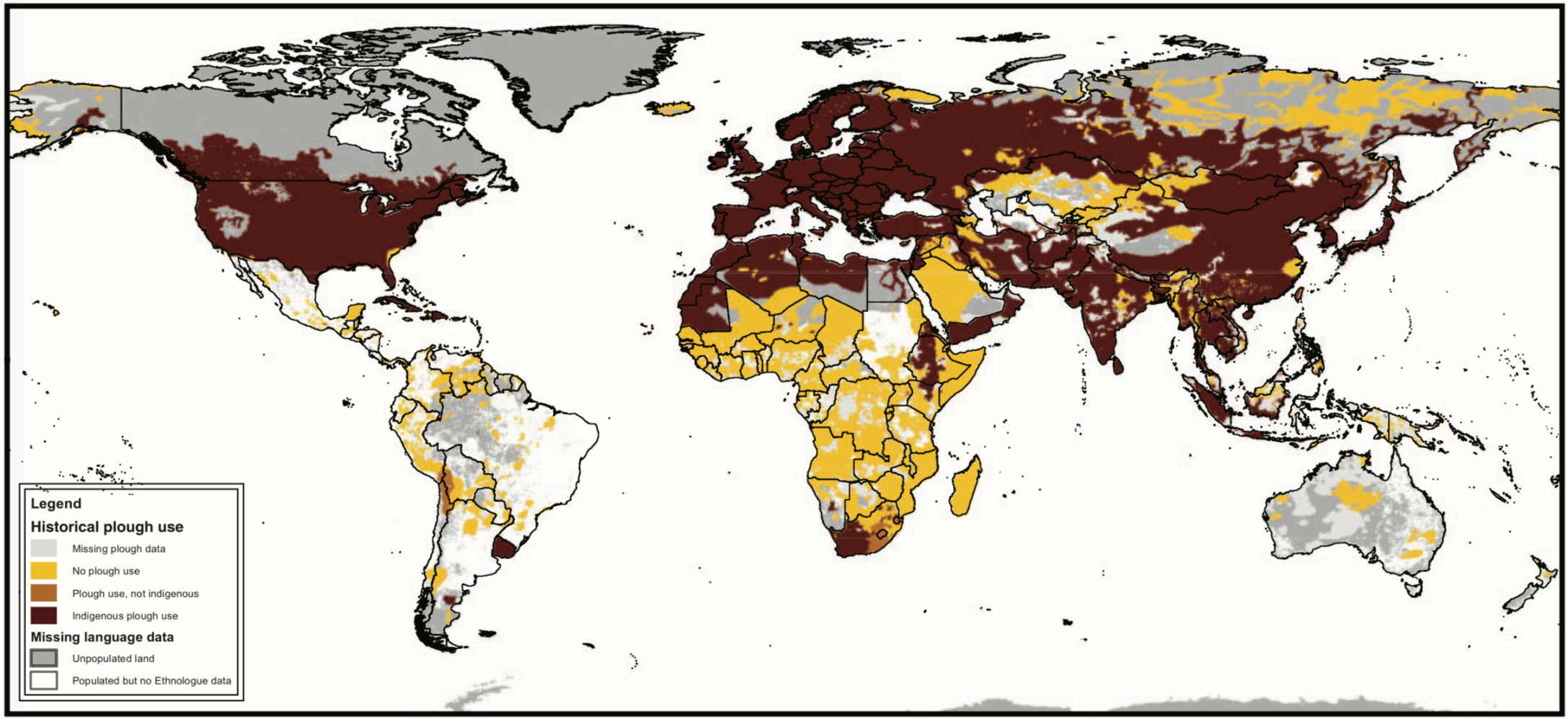


FIGURE II

Traditional Plough Use among the Ethnic/Language Groups Globally

Testing Boserup's Hypothesis

- Specification (country level):

$$y_c = \alpha + \beta \text{Plough}_c + \mathbf{X}_c^{\mathbf{H}}\mathbf{\Gamma} + \mathbf{X}_c^{\mathbf{C}}\mathbf{\Pi} + \varepsilon_c,$$

- where:

  y_c is the outcome of interest, and

  $\mathbf{X}_c^{\mathbf{H}}$ and $\mathbf{X}_c^{\mathbf{C}}$ are historical and contemporary controls.

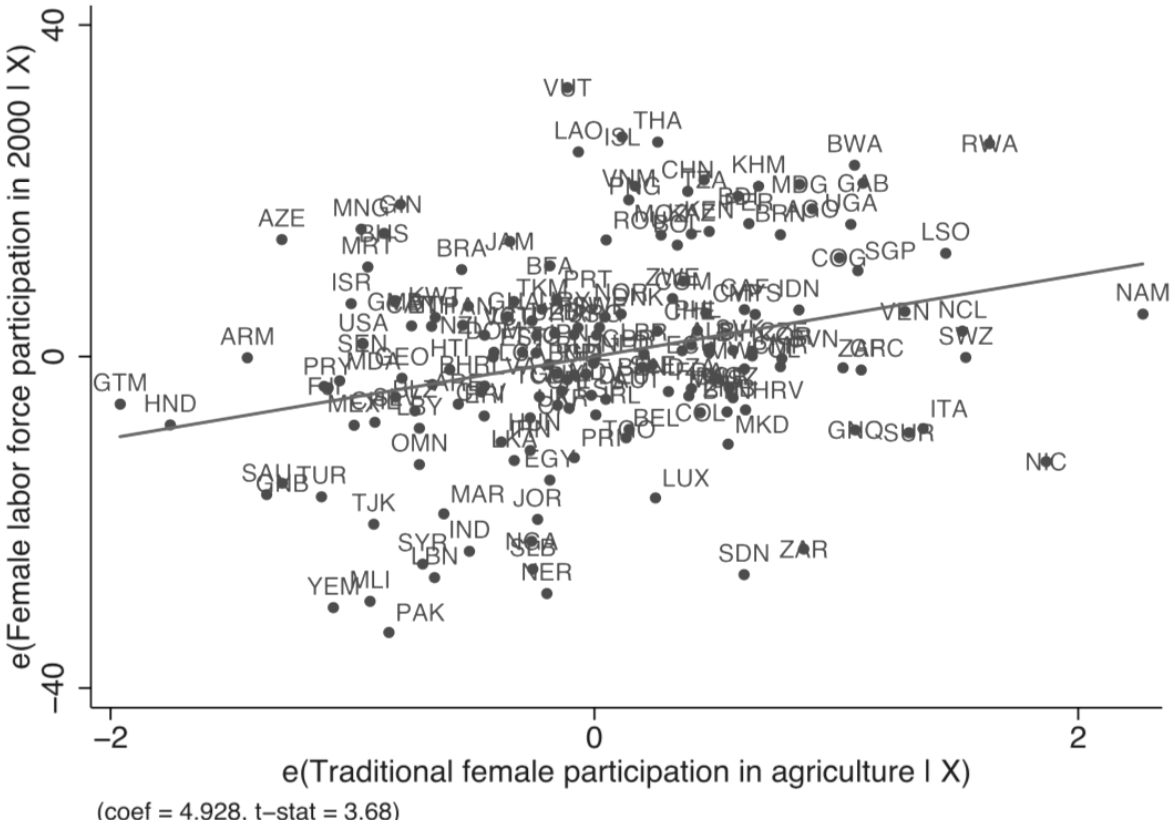
COUNTRY-LEVEL OLS ESTIMATES WITH HISTORICAL AND CONTEMPORARY CONTROLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent variable:							
	Female labor force participation in 2000		Share of firms with female ownership, 2003–2010		Share of political positions held by women in 2000		Average effect size (AES)	
Mean of dep. var.	51.35		35.17		11.83		2.31	
Traditional plough use	−12.401***	−12.930***	−15.241***	−16.587***	−4.821***	−5.129**	−0.743***	−0.845***
	(2.964)	(3.537)	(4.060)	(4.960)	(1.782)	(2.061)	(0.080)	(0.091)
Historical controls:								
Agricultural suitability	6.073	7.181*	0.803	4.322	2.198	1.081	0.262*	0.342**
	(3.696)	(4.175)	(5.447)	(6.071)	(2.605)	(2.548)	(0.139)	(0.139)
Tropical climate	−9.718***	−10.906***	−10.432***	−3.712	−6.086***	−4.169*	−0.362***	−0.06
	(2.487)	(3.070)	(3.762)	(5.711)	(2.094)	(2.396)	(0.084)	(0.101)
Presence of large animals	−2.015	−2.166	2.707	5.610	−5.718	−4.688	0.005	0.201
	(5.372)	(6.072)	(9.745)	(10.417)	(3.565)	(4.132)	(0.121)	(0.146)
Political hierarchies	0.779	1.181	1.128	0.207	0.744	0.656	0.102**	0.070*
	(1.515)	(1.482)	(1.941)	(1.878)	(0.822)	(0.807)	(0.040)	(0.042)
Economic complexity	1.157	1.411*	1.693	0.764	0.454	0.333	0.063***	0.027
	(0.793)	(0.815)	(1.129)	(1.382)	(0.487)	(0.502)	(0.023)	(0.026)
Contemporary controls:								
ln income in 2000	−34.612***	−32.685***	10.766	6.385	−6.530	−6.616	−0.776***	−0.815***
	(6.528)	(7.023)	(9.986)	(10.482)	(4.071)	(4.335)	(0.221)	(0.231)
ln income in 2000 squared	2.038***	1.936***	−0.707	−0.523	0.539**	0.535*	0.051***	0.051***
	(0.406)	(0.431)	(0.688)	(0.706)	(0.271)	(0.281)	(0.015)	(0.015)
Continent fixed effects	no	yes	no	yes	no	yes	no	yes
Observations	165	165	123	123	144	144	144	144
Adjusted R-squared	0.37	0.36	0.11	0.13	0.27	0.27	0.26	0.30
R-squared	0.40	0.41	0.16	0.22	0.31	0.34	0.28	0.33

Endogeneity

- Omitted variables: historically richer countries could have adopted (and historically richer countries have better gender attitudes today).

- Reverse causality: societies with bad gender norms could have adopted the plough (and gender norms are persistent over time).



Plough-Positive and Plough-Negative Crops Pryor *Comparative Studies in Society and History* 1985

- Plough-positive: teff, wheat, barley, rye, wet rice.
- Plough-negative: maize, sorghum, millet, tubers.
- Strategy: Use geo-climatic suitability for plough-positive and plough-negative crops as instruments for plough adoption. FAO Global Agro-Ecological Zones 2002 database.
- Specifically, assess suitability for the plough$\oplus$ cereals wheat, barley, and rye, and for the plough$\ominus$ cereals foxtail millet, pearl millet and sorghum.
- Two sets have similar uses and so only differ in plough suitability.

COUNTRY-LEVEL 2SLS AND REDUCED-FORM ESTIMATES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A. First stage 2SLS estimates. Dependent variable: Traditional plough use							
Mean of dep. var.	0.53		0.44		0.54		0.51	
Plough-positive environment	0.744***	0.629***	0.861***	0.673***	0.820***	0.685***	0.874***	0.717***
	(0.084)	(0.089)	(0.078)	(0.103)	(0.082)	(0.104)	(0.089)	(0.118)
Plough-negative environment	0.119	0.185	0.100	0.115	0.132	0.187	0.129	0.142
	(0.122)	(0.133)	(0.166)	(0.171)	(0.130)	(0.141)	(0.181)	(0.188)
Equality of coefficients (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F-stat (plough variables)	40.21	25.06	66.80	21.88	51.96	21.88	49.54	18.52
	Dependent variable (panels B & C):							
	Female labor force participation in 2000		Share of firms with female ownership, 2005–2011		Share of political positions held by women in 2000		Average effect size (AES)	
Mean of dep. var.	51.10		35.04		11.86		2.31	
	Panel B. Reduced-form estimates							
Plough-positive environment	−10.644***	−11.299***	−13.164**	−12.692**	−5.800**	−6.840**	−0.639***	−0.774***
	(3.816)	(4.285)	(5.610)	(6.214)	(2.534)	(2.790)	(0.214)	(0.288)
Plough-negative environment	18.928***	19.571***	6.072	9.134	−2.975	−2.868	0.607	0.653*
	(6.506)	(6.329)	(9.926)	(10.401)	(6.093)	(6.258)	(0.391)	(0.393)
Equality of coefficients (p-value)	0.00	0.00	0.02	0.02	0.56	0.47	0.00	0.00
F-stat (plough variables)	14.87	12.49	5.41	4.46	3.44	3.40	9.19	7.11
	Panel C. Second-stage 2SLS estimates							
Traditional plough use	−21.630***	−25.013***	−17.486***	−22.689***	−6.460***	−9.726***	−0.918***	−1.313***
	(5.252)	(7.513)	(5.533)	(7.620)	(2.334)	(3.750)	(0.225)	(0.388)
Hausman test (p-value)	0.02	0.04	0.56	0.40	0.22	0.10	0.33	0.16
Hansen J	0.00	0.00	0.41	0.31	0.72	0.86	0.05	0.06
Historical & contemporary controls	yes	yes	yes	yes	yes	yes	yes	yes
Continent FEs	no	yes	no	yes	no	yes	no	yes
Observations	160	160	122	122	140	140	104	104

Discussion

- OLS estimates were pretty large: 1 SD $\uparrow$ (0.472) in plough use $\Rightarrow$
  - FLFP $\downarrow$ 5.85 percentage points (11.4% of its sample mean);
  - Female Ownership $\downarrow$ 7.19 percentage points (20% of its sample mean);
  - Women in politics $\downarrow$ 2.28 percentage points (19% of its sample mean);
- IV coefficients even larger than OLS:
  - Endogeneity of plough adoption by historically advanced societies.
  - These could have better gender norms today, biasing OLS estimates downward.

Pathways

- Do these results represent the evolution of attitudes or of institutions?
- Attitudes = beliefs, cultural norms about role of women
- Institutions = legal systems and policies that inhibit female participation.
- Authors run OLS for attitudes (WVS) that suggest former, not latter.
- More starkly, they examine children of immigrants in US and Europe:
- Not random, but controls very well for institutions.
- Estimating equation:

$$y_{i,s,c} = \alpha_s + \beta \text{Plough}_c + \mathbf{X}_c^{\mathbf{H}}\mathbf{\Gamma} + \mathbf{X}_c^{\mathbf{C}}\mathbf{\Pi} + \mathbf{X}_i\mathbf{\Phi} + \varepsilon_{i,s,c},$$

where i = daughter of immigrant parent living in state s with ancestral origin c (mother or father), $y_{i,s,c}$ = 0-1 participation in labor market, $\mathbf{X}_i$ is individual control (age, marital, education, rural-urban, husband characteristics if married.)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Dependent variable: Labor force participation indicator, 1994–2011								
	All women			Married women					
	Woman's ancestry			Woman's ancestry			Husband's ancestry		
	Father's country	Mother's country	Parents same country	Father's country	Mother's country	Parents same country	Father's country	Mother's country	Parents same country
Mean of dep. var.	0.63	0.63	0.60	0.68	0.69	0.69	0.70	0.71	0.70
Traditional plough use	−0.044***	−0.043**	−0.062***	−0.094**	−0.118***	−0.136**	−0.065***	−0.045**	−0.058**
	(0.015)	(0.018)	(0.020)	(0.046)	(0.043)	(0.054)	(0.024)	(0.022)	(0.024)
Observations	57,138	55,341	32,776	10,206	9,508	6,835	35,393	35,158	23,124
Adjusted R-squared	0.23	0.23	0.25	0.10	0.10	0.11	0.08	0.08	0.08
R-squared	0.23	0.23	0.26	0.11	0.11	0.12	0.09	0.08	0.09

Long Shadows: Africa's Slave Trade

Nunn (2008)

- For half a millenium (1400–1900), African exported slaves.
- Colonial rule in Africa is short in comparison: about 75 years 1885–1960.
- Question: has the slave trade affected modern development in Africa?
- Regression yields significant negative connection.
- More slaves exported, the worse is development today.

"These findings complement the research of Engerman and Sokoloff (1997, 2002), which shows that slavery in the New World resulted in the evolution of institutions that were not conducive to economic growth. My results show that not only was the use of slaves detrimental for a society, but the production of slaves, which occurred through domestic warfare, raiding, and kidnapping, also had negative impacts on subsequent development."

Four Great Slave Trades, from Nunn 2008.

1. The Trans-Atlantic trade:

- Best known, from West Africa, West-Central Africa, and Eastern Africa to European New World colonies.

2. The Trans-Saharan trade: just south of the Sahara to N. Africa.

3. The Red Sea trade: taken from inland of the Red Sea and sent to the Middle East and India.

4. The Indian Ocean trade: taken from Eastern Africa, shipped to the Middle East, India or to plantation islands in the Indian Ocean.

Baseline OLS Equation

Baseline equation is:

$$y_i = b_0 + b_1 s_i + \mathbf{c}_i' d + \mathbf{x}_i' g + \epsilon_i,$$

where:

- y_i is log per capita GDP in 2000 (from Maddison).
- s_i is log slaves exported between 1400 and 1900 normalized by land area (from a variety of sources)
- $\mathbf{c}_i$ indicates the origin of colonizer for country i
- $\mathbf{x}_i$ is a vector of other control variables (geography, climate).

RELATIONSHIP BETWEEN SLAVE EXPORTS AND INCOME

	Dependent variable is log real per capita GDP in 2000, ln y					
	(1)	(2)	(3)	(4)	(5)	(6)
ln(exports/area)	−0.112***	−0.076***	−0.108***	−0.085**	−0.103***	−0.128***
	(0.024)	(0.029)	(0.037)	(0.035)	(0.034)	(0.034)
Distance from equator		0.016	−0.005	0.019	0.023	0.006
		(0.017)	(0.020)	(0.018)	(0.017)	(0.017)
Longitude		0.001	−0.007	−0.004	−0.004	−0.009
		(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
Lowest monthly rainfall		−0.001	0.008	0.0001	−0.001	−0.002
		(0.007)	(0.008)	(0.007)	(0.006)	(0.008)
Avg max humidity		0.009	0.008	0.009	0.015	0.013
		(0.012)	(0.012)	(0.012)	(0.011)	(0.010)
Avg min temperature		−0.019	−0.039	−0.005	−0.015	−0.037
		(0.028)	(0.028)	(0.027)	(0.026)	(0.025)
ln(coastline/area)		0.085**	0.092**	0.095**	0.082**	0.083**
		(0.039)	(0.042)	(0.042)	(0.040)	(0.037)
Island indicator				−0.398	−0.150	
				(0.529)	(0.516)	
Percent Islamic				−0.008***	−0.006*	−0.003
				(0.003)	(0.003)	(0.003)
French legal origin				0.755	0.643	−0.141
				(0.503)	(0.470)	(0.734)
North Africa indicator				0.382	−0.304	
				(0.484)	(0.517)	
ln(gold prod/pop)					0.011	0.014
					(0.017)	(0.015)
ln(oil prod/pop)					0.078***	0.088***
					(0.027)	(0.025)
ln(diamond prod/pop)					−0.039	−0.048
					(0.043)	(0.041)
Colonizer fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number obs.	52	52	42	52	52	42
R^2	.51	.60	.63	.71	.77	.80

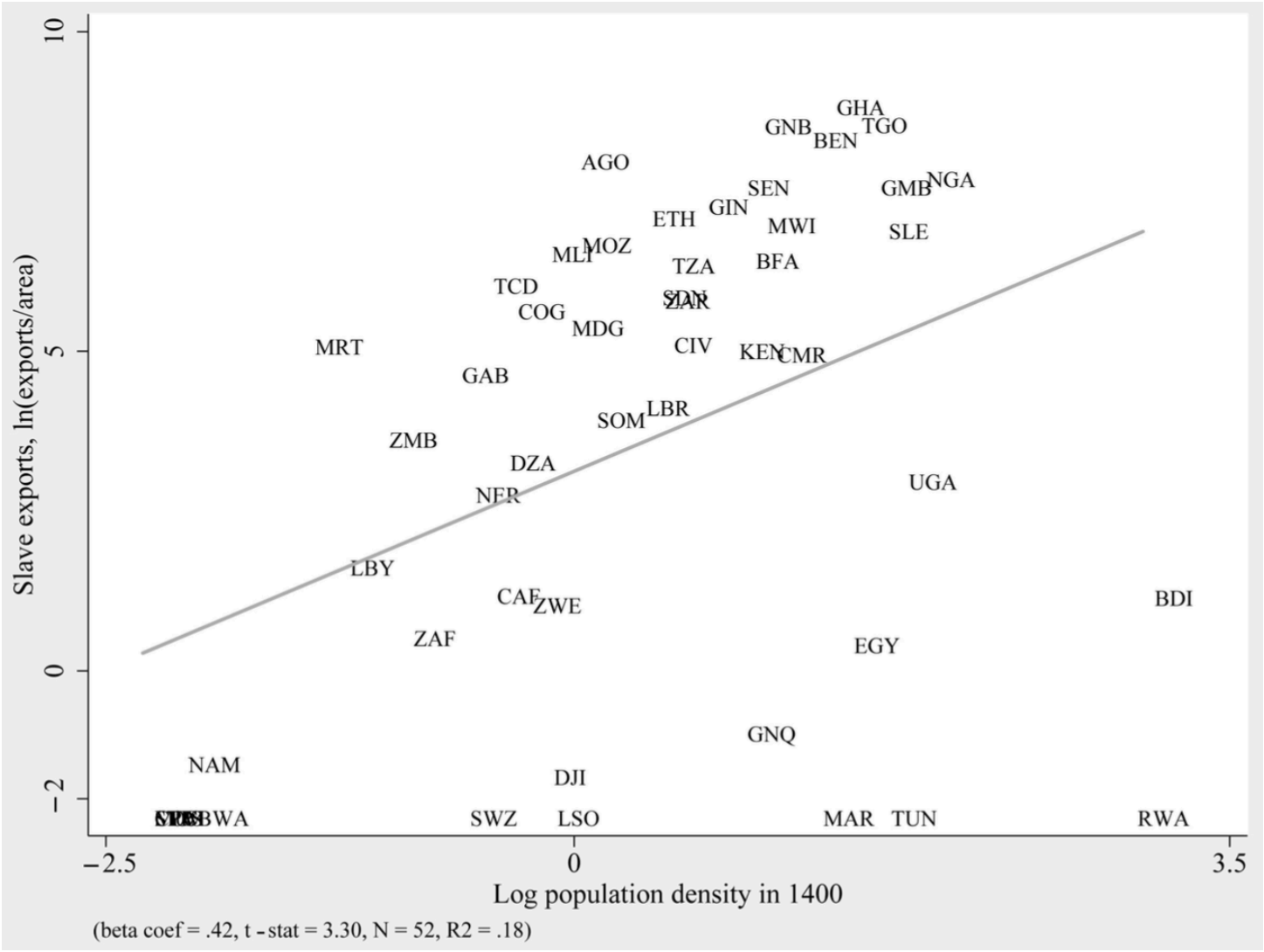
1. Only colonizer fixed effects
2. Geography
3. No island, N. African countries
4. Islamic, French legal system
5. Natural resource endowments
6. Include controls, drop islands and N. Africa

Interpretation and Problems

- Interpretation: 1 SD increase in s has 0.36–0.62 SD decrease in y (col. 5).
- E.g., with a 1 SD decrease in slave trade, $y = \$1{,}249 \rightarrow \$1{,}864$.
- Endogeneity: What if underdeveloped countries selected into the slave trade?
- Compatible with both reverse causation and omitted variables.
- Also potential measurement error especially with slaves from interior.
- Two Strategies
- The historical records show that prosperous countries more likely to enter.
- Instrumental variable: the distance from each country to the location of the demand for slaves. (Discuss.)

Historical Records of the Slave Trade

- Historical records show that *richer* countries more likely to engage in slave trade.



Instrumental Variables

- Distances to worldwide demand points from the country:

1. [Atlantic] to nine largest importers: Virginia, Havana, Haiti, Kingston, Dominica, Martinique, Guyana, Salvador, and Rio.

2. [Indian Ocean]: to Mauritius and Muscat.

3. [Trans-Saharan]: to Algiers, Tunis, Tripoli, Benghazi, and Cairo.

4. [Red Sea] to the export ports of Massawa, Suakin, and Djibouti.

Discussing the Instruments

- From Nunn (2008), p. 160:

"The validity of the instruments relies on the presumption that although the location of demand influenced the location of supply, the location of supply did not influence the location of demand. If sugar plantations were established in the West Indies because the West Indies were close to the western coast of Africa, then the instruments are not valid. However, if instead many slaves were taken from western Africa because it was relatively close to the plantation economies in the West Indies, then the instruments are potentially valid. According to the known history of the slave trades, it was the location of demand that influenced the location of supply and not vice versa. The location of the demand for African slaves was determined by a number of factors, all unrelated to the supply of slaves. In the West Indies and the southern United States, slaves were imported because of climates suitable for growing highly valued, globally traded commodities such as sugar and tobacco. The existence of gold and silver mines was a determinant of the demand for slaves in Brazil. In the northern Sahara, Arabia, and Persia, slaves were needed to work in salt mines, and in the Red Sea area slaves were used as pearl divers."

TABLE IV

ESTIMATES OF THE RELATIONSHIP BETWEEN SLAVE EXPORTS AND INCOME

	(1)	(2)	(3)	(4)
Second Stage. Dependent variable is log income in 2000, $\ln y$				
ln(exports/area)	−0.208***	−0.201***	−0.286*	−0.248***
	(0.053)	(0.047)	(0.153)	(0.071)
	[−0.51, −0.14]	[−0.42, −0.13]	[−∞, +∞]	[−0.62, −0.12]
Colonizer fixed effects	No	Yes	Yes	Yes
Geography controls	No	No	Yes	Yes
Restricted sample	No	No	No	Yes
F-stat	15.4	4.32	1.73	2.17
Number of obs.	52	52	52	42
First Stage. Dependent variable is slave exports, ln(exports/area)				
Atlantic distance	−1.31***	−1.74***	−1.32*	−1.69**
	(0.357)	(0.425)	(0.761)	(0.680)
Indian distance	−1.10***	−1.43***	−1.08	−1.57*
	(0.380)	(0.531)	(0.697)	(0.801)
Saharan distance	−2.43***	−3.00***	−1.14	−4.08**
	(0.823)	(1.05)	(1.59)	(1.55)
Red Sea distance	−0.002	−0.152	−1.22	2.13
	(0.710)	(0.813)	(1.82)	(2.40)
F-stat	4.55	2.38	1.82	4.01
Colonizer fixed effects	No	Yes	Yes	Yes
Geography controls	No	No	Yes	Yes
Restricted sample	No	No	No	Yes
Hausman test (p-value)	.02	.01	.02	.04
Sargan test (p-value)	.18	.30	.65	.51

Long Shadows: British Rent Extraction in India

- Banerjee and Iyer, AER (2005) [BI]

- Different in that it studies one historical institution (land revenue collection) in a specific country (India).

- British set up rent collection systems starting in the late 18th century and continuing through the 19th century.

- Claim: districts with landlord-based rent collection systems underperform in the present:

- Criteria: agricultural yields, agricultural investments, public investment in education, health and educational outcomes.

- E.g.: wheat yields 23% higher and infant mortality 40% lower in "non-LL" districts.

Revenue Collection

- The British started in Bengal and Bihar (1765), and then radiated out from there.

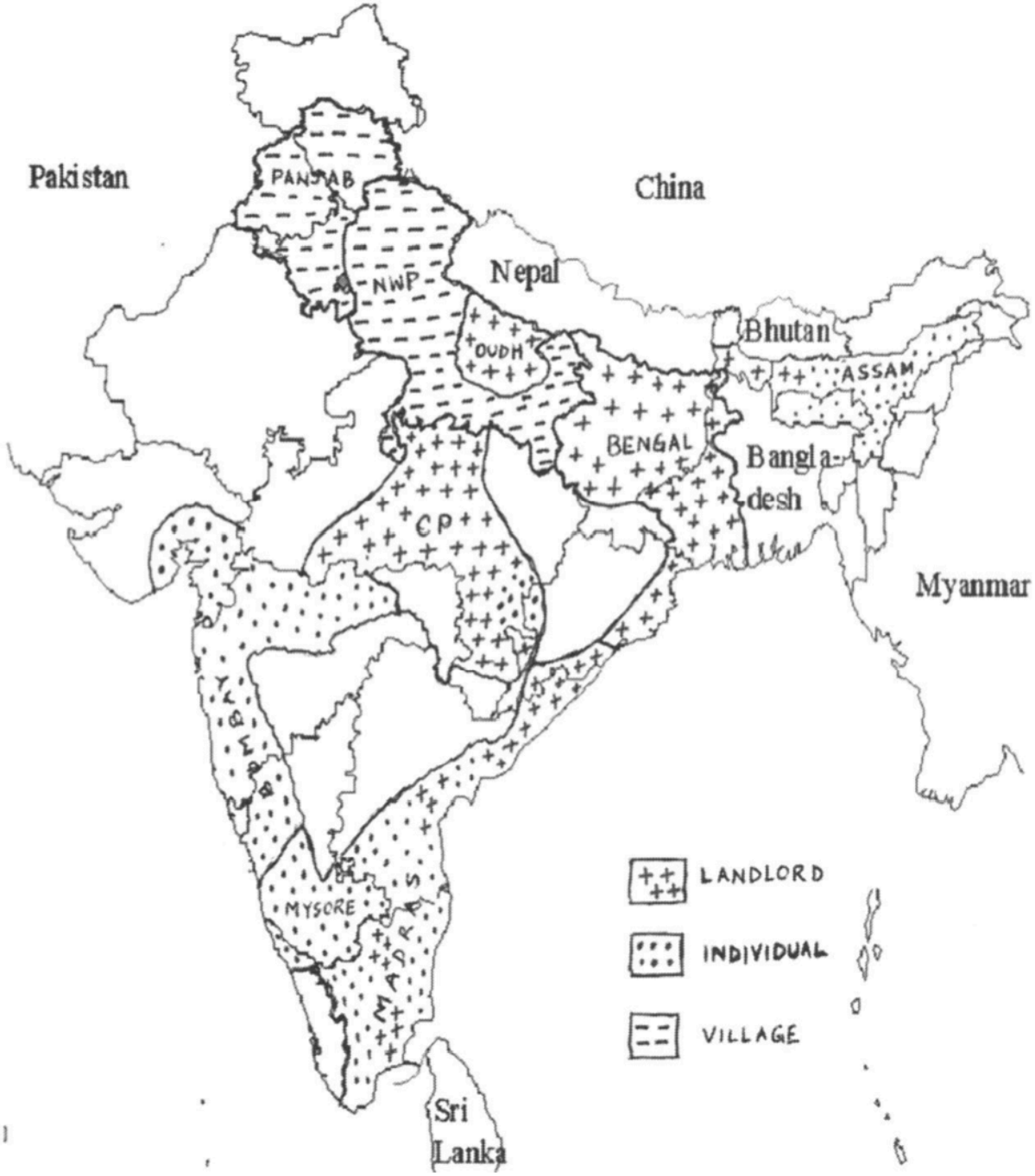
- Conquests: Orissa (1803), Assam (1824–26), Madras Presidency (1765, 1792–1801), Gujarat (1803), Bombay Presidency (1817-18), Central Provinces (up to 1860), Oudh (1856).

- Different revenue systems installed.

- Land taxes 60% of British government revenue in 1841.

- Mainly fixed rent systems of different kinds (rent adjusted periodically).

- Zamindari: Landlords pay fixed rent to British, collect freely from peasants.
  - Bengal, Bihar, Orissa, Central Provinces (MP), some parts of Madras Presidency (now Tamil Nadu + Andhra Pradesh).
  - Some of these subject to Permanent Revenue Settlement Act of 1793.
- Ryotwari: Individual cultivators pay directly.
  - Most areas of Madras or Bombay Presidency.
- Mahalwari: Village-based revenue collection.
  - North-West Provinces, Punjab.


Pakistan
China
PANJAB
NWP
Nepal
OUDH
Bhutan
ASSAM
BENGAL
Bangla-
desh
CP
Myanmar
MYSORE
Sri
Lanka
LANDLORD
INDIVIDUAL
VILLAGE

Specification

- $y_{it} = A + \alpha_t + \beta \text{NL}_i + \gamma X_{it} + \epsilon_{it}$, where:
- $i =$ district
- y_{it}: % irrigated area, fertilizer/hectare, % under HYV, crop yields, schools and health centers,
- α_t is year effect
- NL is measure of non-landlord system
- X_{it}: controls (latitude, altitude, soil, rainfall, time under British rule).

The Identification Problem

- What determined the rental system? BI emphasize:

- Individual influence: Munro (Madras), Elphinstone (Bombay).

- Political events: Like NW, Oudh was slated to be village-based, but 1857 Mutiny breaks out, British resort to landlord system.

- Date of conquest: More ryotwari later. Direct dealings with cultivators easier once administrative systems had expanded. IV: conquest between 1820–1856.

- Exclusion restriction?:

- Existing presence of landlord class could have informed choices.

- High-inequality landlord areas conquered initially, stubborn non-LL areas later.

- Why did Oudh go LL, no reversal elsewhere in NWP?

OLS with non-LL proportions by district, and non-LL dummies

TABLE 3—DIFFERENCES IN AGRICULTURAL INVESTMENTS AND YIELDS
(*Mean non-landlord proportion = 0.5051 (s.d. = 0.4274)*)

Dependent variable	Mean of dependent variable	Coefficient on non-landlord proportion: OLS Full sample (1)	Coefficient on non-landlord proportion: OLS Excluding Bengal and Bihar (2)	Coefficient on non-landlord dummy: OLS Full sample (3)	Coefficient on non-landlord dummy: OLS Excluding village-based districts (4)
Agricultural investments					
Proportion of gross cropped area irrigated	0.276	0.065*	0.066*	0.077***	0.005
		(0.034)	(0.035)	(0.027)	(0.032)
Fertilizer use (kg/ha)	24.64	10.708***	10.992***	9.988***	10.695***
		(3.345)	(3.406)	(2.301)	(3.040)
Proportion of rice area under HYV	0.298	0.079*	0.094**	0.016	0.074*
		(0.044)	(0.043)	(0.032)	(0.038)
Proportion of wheat area under HYV	0.518	0.092**	0.119***	0.031	0.107**
		(0.046)	(0.045)	(0.036)	(0.052)
Proportion of other cereals area under HYV	0.196	0.057*	0.084***	−0.035	0.109***
		(0.031)	(0.024)	(0.025)	(0.041)
Agricultural productivity					
log (yield of 15 major crops)		0.157**	0.152**	0.173***	0.089
		(0.071)	(0.074)	(0.053)	(0.085)
log (rice yield)		0.171**	0.195**	0.099	0.173**
		(0.081)	(0.081)	(0.062)	(0.079)
log (wheat yield)		0.229***	0.228***	0.188***	0.143
		(0.067)	(0.070)	(0.054)	(0.098)
No. of districts		166	143	166	109
Year fixed effects		YES	YES	YES	YES
Geographic controls		YES	YES	YES	YES
Date of British land revenue control		YES	YES	YES	YES

Notes: Standard errors in parentheses, corrected for district-level clustering. * Significant at 10-percent level; ** significant at 5-percent level; *** significant at 1-percent level. Each cell represents the coefficient from a regression of the dependent variable on the measure of non-landlord control. Data are from 1956 to 1987. Data for area under high-yielding varieties (HYV) is after 1965. Geographic controls are altitude, latitude, mean annual rainfall, and dummies for soil type and coastal regions. The non-landlord dummy is assigned as follows: the dummy equals one for all individual-based districts and all village-based districts except those in Oudh. For landlord-based districts and the village-based districts of Oudh, the dummy is zero.

Robustness with neighboring districts, and IV

Panel A: Robustness checks

	Coefficient on non-landlord proportion	
Dependent variable	OLS Neighbors only (1)	IV Full sample (2)
Agricultural investments		
Proportion of gross cropped area irrigated	0.101**	0.216
	(0.041)	(0.137)
Fertilizer use (kg/ha)	10.589**	26.198**
	(4.979)	(13.244)
Proportion of rice area under HYV	−0.015	0.411**
	(0.083)	(0.163)
Proportion of wheat area under HYV	0.078**	0.584***
	(0.034)	(0.163)
Proportion of other cereals area under HYV	−0.025	0.526***
	(0.024)	(0.129)
Agricultural productivity		
log (yield of 15 major crops)	0.145**	0.409
	(0.061)	(0.261)
log (rice yield)	0.126	0.554*
	(0.098)	(0.285)
log (wheat yield)	0.253***	0.706***
	(0.084)	(0.214)
No. of districts	35	166
Year fixed effects	YES	YES
Geographic controls	YES	YES
Date of British land revenue control	YES	YES

Panel B: First-stage regressions for IV
Dependent variable: Non-landlord proportion

Coefficient on	(1)	(2)	(3)
Instrument (=1 if date of British revenue control is between 1820 and 1856)	0.331***	0.430***	0.419***
	(0.086)	(0.092)	(0.087)
R-squared	0.40	0.43	0.63
No. of observations	166	166	166
Geographic controls	YES	YES	YES
Date of British land revenue control	YES	YES	YES
Date of British land revenue control squared	NO	YES	NO
State fixed effects	NO	NO	YES

- Main investments appear after 1965, and in non-LL districts.

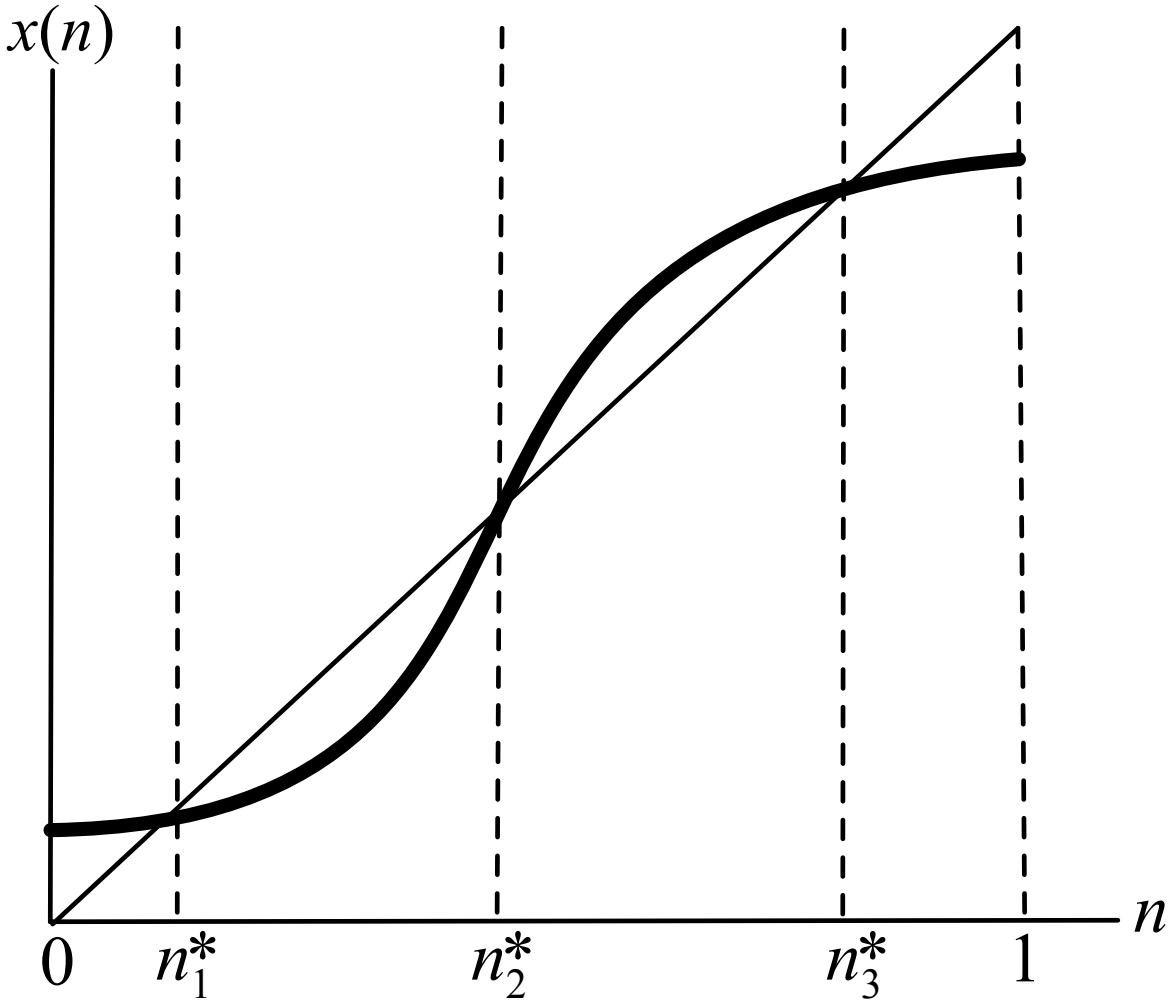
TABLE 6—WHEN DO THE DIFFERENCES APPEAR?

Panel A: Full sample

Dependent variable	Coefficient on non-landlord proportion: 1956–1965 (1)	Coefficient on non-landlord proportion: After 1965 (2)	Difference (3)
Agricultural investments			
Proportion of gross cropped area irrigated	0.046	0.079**	0.033**
	(0.033)	(0.036)	(0.016)
Fertilizer use (kg/ha)	1.026**	15.581***	14.55***
	(0.425)	(4.763)	(4.44)
Agricultural productivity			
log (yield of 15 major crops)	0.066	0.201***	0.135***
	(0.065)	(0.076)	(0.033)
log (rice yield)	0.108	0.196**	0.088**
	(0.069)	(0.089)	(0.044)
log (wheat yield)	0.146**	0.268***	0.122*
	(0.058)	(0.079)	(0.063)
No. of districts	166	166	166
Year fixed effects	YES	YES	YES
Geographic controls	YES	YES	YES
Date of British land revenue control	YES	YES	YES

- A lot of these investments made under Intensive Rural Development Programs
  - HYV in rice and wheat
  - public infrastructure (including fertilizer delivery)
- BI argue that former LL districts were worse at collective action to get public investment:
  - "[O]ne way to characterize the difference in the nature of public action is to say that landlord-dominated states were busy carrying out land reform exactly when the non-landlord states started focusing on development."

And What About Transitions?



Equilibrium Transition? Fertility Decline in Bangladesh

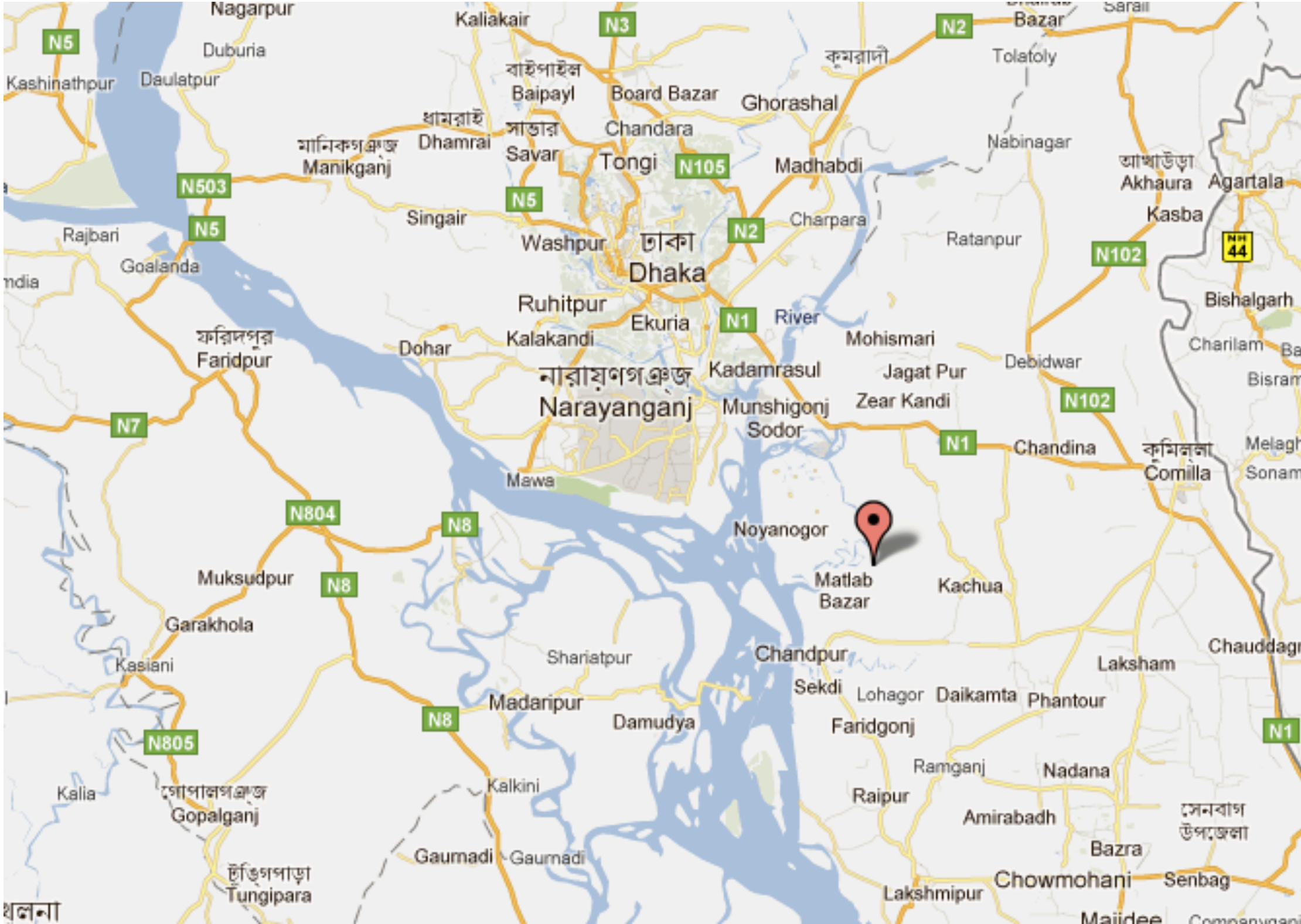
- Munshi and Myaux (JDE 2006)
- 1983–1993: Total fertility rate goes from 4.5 to 2.9.
- This is a huge drop.
- Norms governing fertility use and contraception.
- Contraception went from 40% in 1983 to 63% in 1993.
- "This paper provides a norm-based explanation for two features of the fertility transition that have been observed in many different settings: the slow response to external interventions and the wide variation in the response to the same intervention."

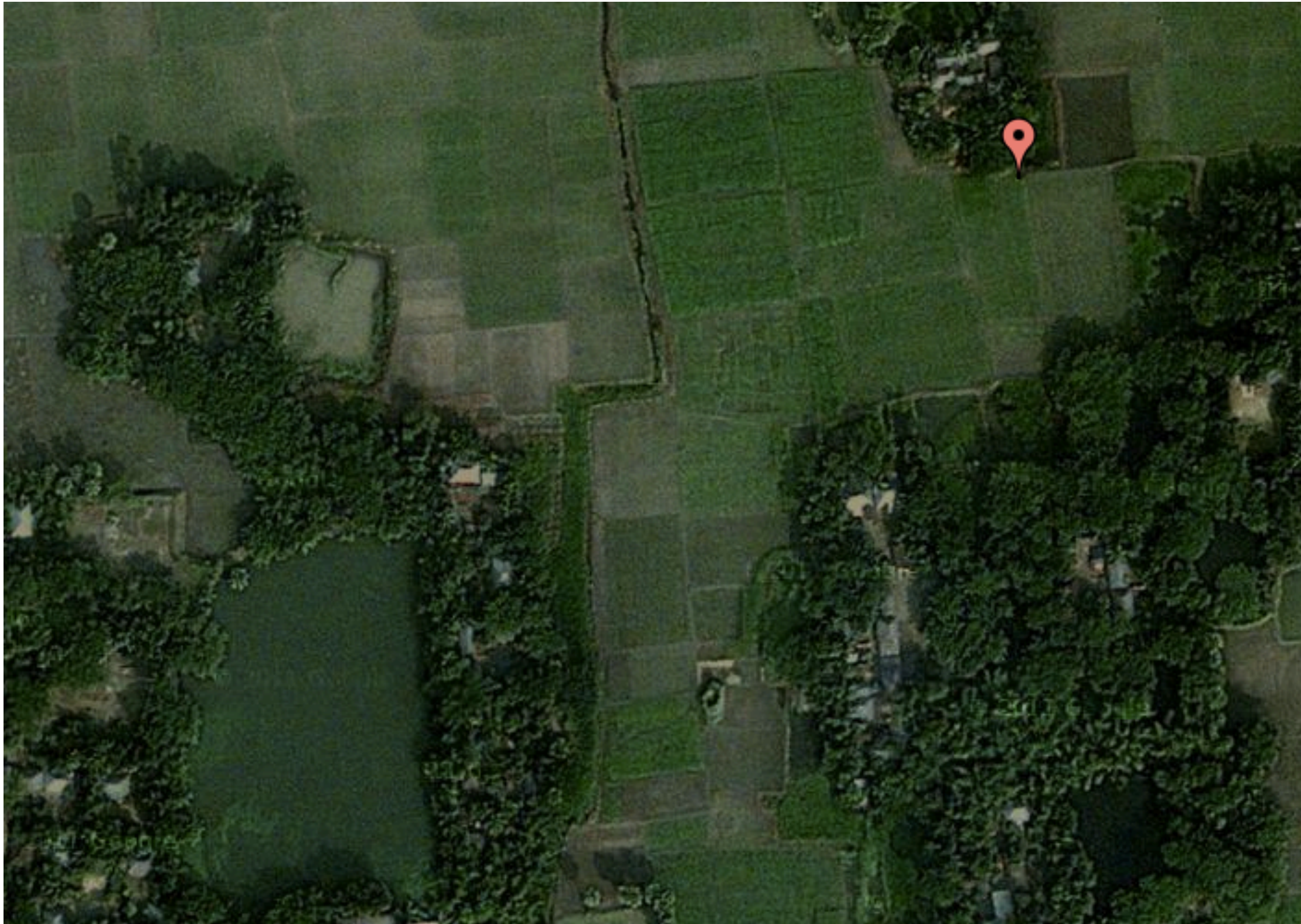
Bangladesh

Period	*Birth rate*	*Death rate*
1881-91	-	41.3
1891-01	-	44.4
1901-11	53.8	45.6
1911-21	52.9	47.3
1921-31	50.4	41.7
1931-41	52.7	37.8
1941-51	49.4	40.7
1951-61	51.3	29.7
1961-74	48.3	19.4
1976	45.4	19.7
1980	43.8	13.6
1986	38.9	11.9
1989	36.7	10.7
1994	27.8	8.6
2000	27.2	7.4
2010	20.8	6.1

Taken from Cleland and Streathfield, BBS, World Bank


Charikar
Kabul
Jalalabad
Peshawar
Jammu and Kashmir
fghanistan
Gardēz
Khowst
Rawalpindi
Himachal Pradesh
Kandahar
Faisalabad
Lahore
西藏自治区
Lhasa
拉萨
Quetta
Multan
Okāra
Punjab
Chandigarh
Uttarakhand
Pakistan
Sibbi
Baitadi
Dipayal
Haryana
Meerut
Bahāwalpur
New Delhi
Nepalganj
Nepal
Kathmandu
Khairpur
Uttar Pradesh
Aligarh
Sikkim
Bhutan
Khuzdar
Agra
Barabanki
Bharatpur
Birganj
Rajasthan
Jaipur
Assam
Shaheed Benazir Abad
Gwalior
Kanpur
Jodhpur
Biratnagar
Meghalaya
Karachi
Kota
Allahabad
Patna
Bihar
Hyderabad
Varanasi
Bihar Sharif
Udaipur
Bhawani Mandi
Rajshahi
Jharkhand
Madhya Pradesh
Ahmedabad
Gujarat
India
West Bengal
Ujjain
Jessore
Rajkot
Vadodara
Indore
Chhattisgarh
Bagasara
Surat
Nagpur
Bhilai
Baleshwar
Tripura
Amravati
Valsad
Bhadrakh
Tumbru
Akola
Wardha
Nashik
Orissa
Bhubaneswar
Dakhinpar
Mizoram
Boisar
Chandanpur
Sittwe
Maharastra
Damanjodi
Mumbai
Umbraj
Hanamkonda
Pune
Vishakhapatnam
Solapur
Hyderabad


Nagarpur
Kaliakair
N3
N2
Bazar
N5
Duburia
Tolatoly
Kashinathpur
Daulatpur
বাইপাইল
Baipayl
Board Bazar
Ghorashal
ধামরাই
Dhamrai
সাভার
Savar
Chandara
Nabinagar
মানিকগঞ্জ
Manikganj
Tongi
N105
Madhabdi
আখাউড়া
Akhaura
Agartala
N503
N5
Singair
Kasba
Charpara
Rajbari
Washpur
ঢাকা
Dhaka
N2
Ratanpur
N102
NH 44
Goalanda
Ruhitpur
Ekuria
N1
River
Bishalgarh
ফরিদপুর
Faridpur
Kalakandi
Mohismari
Charilam
Dohar
Debidwar
নারায়ণগঞ্জ
Narayanganj
Kadamrasul
Jagat Pur
Bisram
N7
Munshigonj
Zear Kandi
N102
Sodor
N1
Chandina
কুমিল্লা
Comilla
Mawa
N804
N8
Noyanogor
Muksudpur
N8
Matlab
Bazar
Kachua
Garakhola
Kasiani
Shariatpur
Chandpur
Laksham
Sekdi
Lohagor
Daikamta
Phantour
Madaripur
N8
Damudya
Faridgonj
N805
N1
Ramganj
Nadana
Kalkini
Kalia
Raipur
গোপালগঞ্জ
Gopalganj
Amirabadh
সেনবাগ
উপজেলা
Bazra
Gaurnadi
Gaurnadi
Chowmohani
Senbag
ঢুঙ্গিপাড়া
Tungipara
Lakshmipur



- Maternal Child Health - Family Planning (MCH-FP) project

- Launched in 1978, 70 villages in Matlab thana, Comilla district.

- Intensive family planning program

- Community Health Worker (CHW) visited each family once every 2 weeks since start of the project in 1978.

- Contraceptives are provided to them free of cost.

- Use goes from from 40% in 1983 to 63% in 1993

- TFR from 4.5 to 2.9 children over that period.

Table 1: Percent distribution of couples using each contraceptive method, Matlab 1998

Method	n	Percent of total
A. Users		
Pill	2,396	19.4
Intra-Uterine Device	171	1.6
Injectibles	4,015	32.6
Condom	605	4.9
Tubal ligation	634	5.1
Vasectomy	16	0.1
Others	287	2.4
B. Non-users	4,186	33.9
All	**12,342**	**100**

Khan-Bairagi (1998)

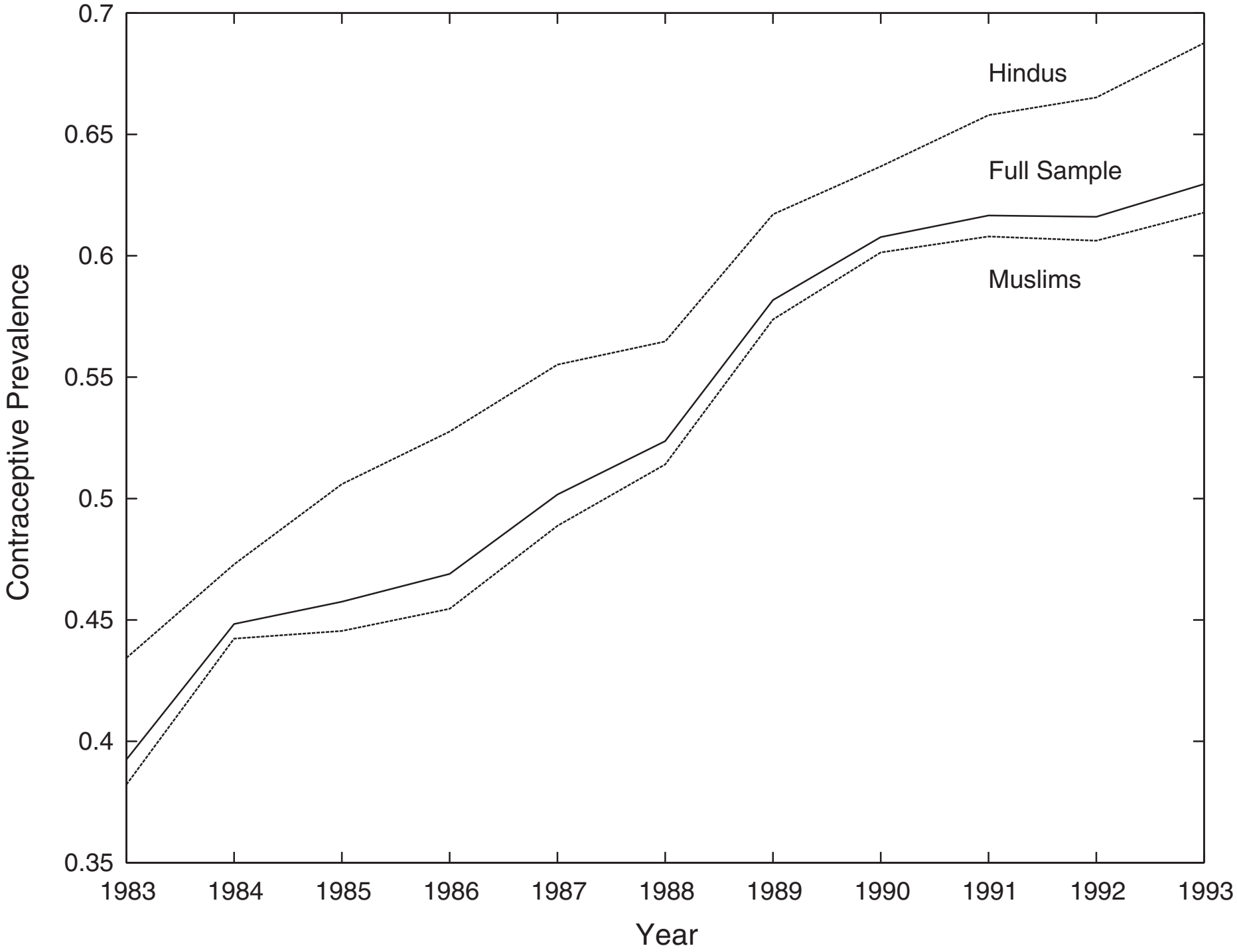


Fig. 1. Contraceptive prevalence over time.

- Strong initial hostility to MCH-FP, especially from religious leaders.
- Especially hostile reaction against community health workers (violating *purdah*)
- Also, pressure against contraceptive use (linked to perceived promiscuity)
- Women in village limited in their mobility:
- Schuler et al. (1997) survey of 1300 married women under 50, 1992.
- Ever been to market, a medical facility, the movies, and outside the village.
- One point for accompanied visit, 2 points for solo visit.
- Mean score 2.1 (out of a maximum of 8).

- Sample: all married women 15–49 in MCH-FP area, 1983–93.

Table 2
Descriptive statistics

	Full sample	Hindus	Muslims	Illiterate	Literate
	(1)	(2)	(3)	(4)	(5)
Panel A: Individual characteristics					
Age	29.44 (8.01)	29.91 (8.00)	29.34 (8.01)	30.49 (8.18)	27.75 (7.44)
Number of children	2.41 (1.99)	2.18 (1.79)	2.45 (2.03)	2.57 (2.05)	2.14 (1.86)
Education	2.12 (3.12)	1.48 (2.68)	2.26 (3.19)	0.00–	5.53 (2.55)
Husband's education	3.21 (4.00)	3.07 (3.81)	3.24 (4.04)	1.53 (2.62)	5.91 (4.34)
Panel B: Occupation of household head (%)					
Farming	34.48	23.45	36.88	30.32	41.16
Fishing	5.80	26.18	1.37	8.07	2.15
Business	6.75	8.37	6.40	6.30	7.47
Housework	10.46	6.81	11.26	10.00	11.21
Other	42.51	35.20	44.10	45.31	38.01
Total	100.00	100.00	100.00	100.00	100.00
Panel C: Asset ownership					
Land (hectares)	1.00 (2.55)	0.72 (1.39)	1.06 (2.74)	0.82 (2.41)	1.29 (2.74)
Cows	1.06 (1.57)	0.81 (1.42)	1.11 (1.59)	0.91 (1.46)	1.28 (1.70)
Boats	0.55 (0.61)	0.63 (0.76)	0.54 (0.57)	0.55 (0.61)	0.56 (0.60)
No. of Observations	21,570	3847	17,723	13,288	8282
Panel D: Contraceptive prevalence					
Probability of using contraceptives	0.55 (0.50)	0.59 (0.49)	0.54 (0.50)	0.53 (0.50)	0.57 (0.50)
No. of Observations	144,186	26,414	117,772	91,727	52,459

Means (standard deviations) in panel A, panel C and panel D.
The individual is the unit of observation in panels A–C. The individual-year is the unit of observation in panel D.
All statistics in this table are computed over the full 1983–93 sample period.

- Is the fertility decline a multiple equilibrium phenomenon?

- Idea: regress current contraception use on overall contraception

- But there is a problem here with identification (Manski critique)

- Omitted variable that correlates individual and village-level use?

- The regression:

$$y_{it} = A + \gamma y_{i,t-1} + \beta x_{t-1}^{v(i)} + \eta Z_{it} + C_t^{v(i)} + \epsilon_{ivt}$$

- y_i is 0-1 for contraceptive use by couple i, t is time, x is aggregate village-level use, $v(i)$ is the village of person i, Z a vector of individual characteristics (such as age), A is a constant and

- C_t^v is unobserved omitted variable for village v at date t.

C_t^v

- C_t^v can be decomposed into three parts.
  - First component only depends on the village: C_1^v.
  - Second component only depends on time: C_{t2}.
  - Third varies in a village-specific way over time.
- Components 1 and 2 dealt with by village and time fixed effects.
  - The last one screws everything up: identification problem.

Main Idea in Munshi-Myaux Paper

- Inter-religion communication low.
- So include own-group and cross-group use separately.
- If own-effect strong, then pushes back the Manski critique:
- New regression:

$$y_{it} = A + \gamma_m y_{i,t-1} + \beta_{mm} x_{t-1}^{v(i),m} + + \beta_{mh} x_{t-1}^{v(i),h} + \eta_m Z_{it} + C_t^{v(i),m} + \epsilon_{ivt}$$

- where i is m-household, and m and h labels self-explanatory.
- For critique to still work, there has to be an omitted variable which is village-, time- and group-specific.

Table 3
Partitioning the village by religion

	Dependent variable: contraception							
	All villages		More than 5% Hindus/Muslims		More than 15% Hindus/Muslims		Annual data	
	Muslims	Hindus	Muslims	Hindus	Muslims	Hindus	Muslims	Hindus
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged contraceptive prevalence (own group)	0.217	0.161	0.193	0.169	0.207	0.168	0.312	0.246
	(0.013)	(0.014)	(0.016)	(0.017)	(0.018)	(0.020)	(0.023)	(0.023)
Lagged contraceptive prevalence (other group)	0.008	0.009	0.007	0.024	− 0.001	0.019	0.009	0.006
	(0.006)	(0.007)	(0.011)	(0.016)	(0.013)	(0.024)	(0.011)	(0.012)
Lagged contraception	0.698	0.712	0.704	0.710	0.706	0.717	0.498	0.517
	(0.003)	(0.005)	(0.004)	(0.005)	(0.004)	(0.006)	(0.005)	(0.008)
R^2	0.513	0.559	0.520	0.558	0.521	0.565	0.281	0.338
Number of observations	139,875	43,101	79,927	29,771	49,730	20,756	70,787	21,419
Box–Pearson Q statistic	0.000	0.003	0.001	0.002	0.002	0.006	0.003	0.008

Standard errors in parentheses.
Standard errors are robust to heteroskedasticity and correlated residuals within each village-period.

Summary

- Convergence versus divergence:
  - Convergence leads to problematic methodology.
  - Also violated in the data (not discussed here)
- Complementarities and multiple steady states:
  - Numerous examples
  - Complementarity mapping

- Long shadows:
  - Origins of property rights
  - Early technologies
  - Slavery
  - Colonial rent collection
- Transitions:
  - Fertility decline in Bangladesh
- General problem: Identification of these effects
  - The use of instrumental variables and other devices
  - The identification-creativity frontier.