Development Economics

Slides 10a [Supplement]

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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.

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"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

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:

- From just south of the Sahara to N. Africa.

3. The Red Sea trade:

- From inland of the Red Sea to the Middle East and India.

4. The Indian Ocean trade:

- From Eastern Africa to the Middle East, India or 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

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable is log real per capita GDP in 2000, $\ln y$					
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, $y = \$1,249 \rightarrow \$1,864$.

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- **Two Strategies**

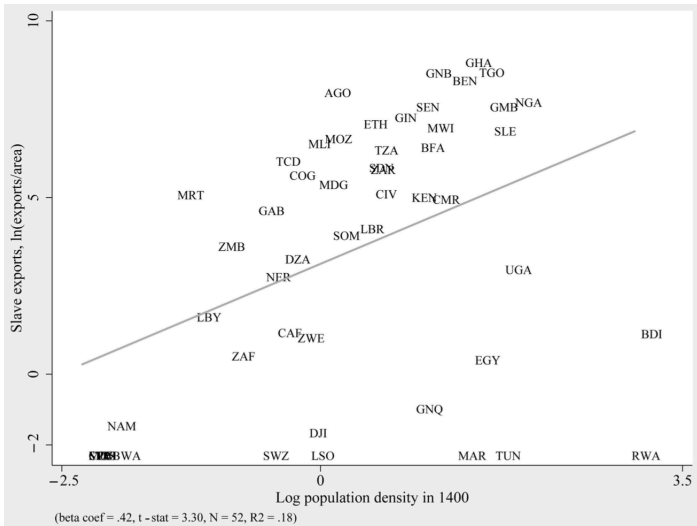- Historical records: richer countries more likely to enter into trade.

- Instrumental variable:

  Distance from each country to the location of the demand for slaves.

  (**Discuss.**)

Historical Records of the Slave Trade

■ **Prosperous countries more likely to enter into slave trade**.

(beta coef = .42, t - stat = 3.30, N = 52, R2 = .18)

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

"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."

	(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

What might cause the connection between slave trade and underdevelopment today?

1. Slave Trade Retained Ethnic Fractionalization

- The slave trade bred within-country hostilities across ethnicities:

  - discouraging formation of larger communities or ethnic groups.

- A measure of fractionalization: n groups

$$F = \sum_i n_i (1 - n)i$$

  - which measures the probability that two people drawn at random come from different groups (why?).

■ **The slave trade and ethnic fractionalization:**

(beta coef = .70, t -stat = 6.95, N = 51, R2 = .50)
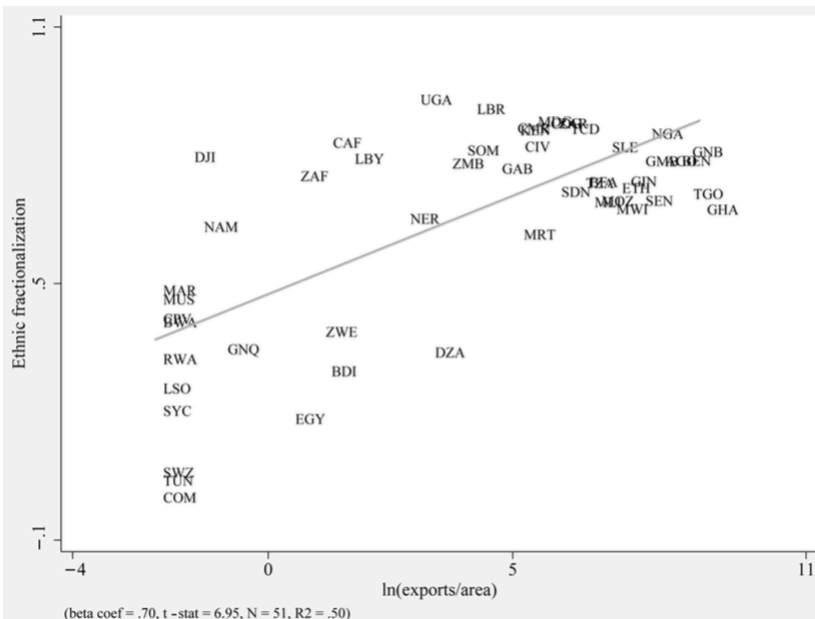
2. Slave Trade Retarded the Growth of the State

■ The slave trade set back the development of the State:

▪ By this, we refer to the pre-colonial state in the 19th century.

▪ Use a measure proposed by Gennaioli and Rainer (2006), using ethnographic data from Murdock (1967) on the number of jurisdictional hierarchies beyond the local community.

▪ Gennaioli and Rainer (2006) argue that countries with ethnicities that had such centralized precolonial state institutions provide more public goods today.

■ The slave trade and pre-colonial State development:

(beta coef = −.37, t-stat = −2.63, N = 47, R2 = .13)
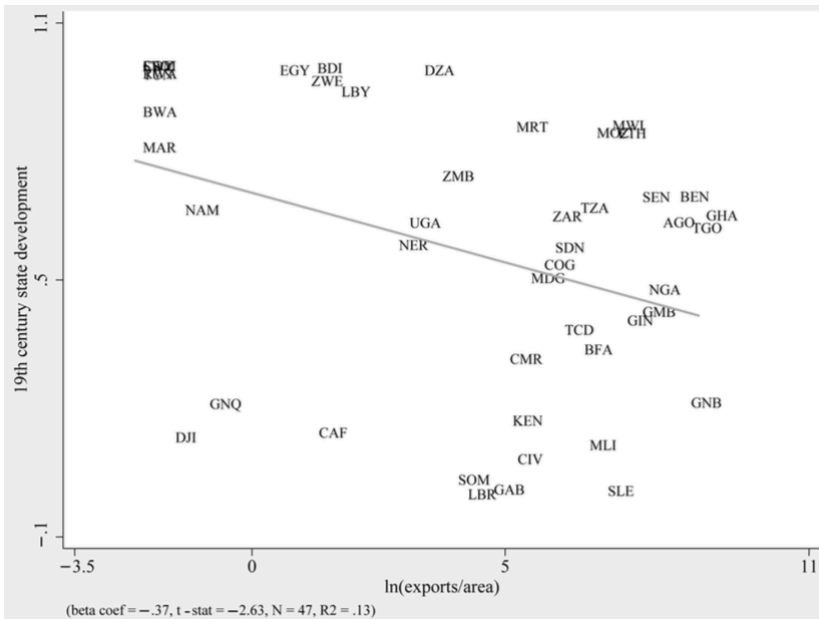
Long Shadows: British Rent Extraction in India

- 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.

Channels

- Two possibilities:

- LL-collection created inequalities that persist to the present day.

- LL-districts created social antagonism that has limited collective action to redistribution and not to lobbying for fresh investment.

- BI go for the latter channel, for two reasons:

- Land reforms have created convergence in land inequalities, and

- The gap between LL and non-LL districts widened in 1965–80, precisely when there was extensive public investment in rural areas.

- It seems that LL districts failed to claim their "fair share" of public investment.

- ■ 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.
  - Fell thereafter.
  - 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.

TABLE 1—STATE-WISE DISTRIBUTION OF LANDLORD AND NON-LANDLORD DISTRICTS

State	Mean non-landlord proportion	Classification of revenue systems				Total districts
		Landlord based	Individual based	Village bodies		
				Landlord	Non-landlord	
Andhra Pradesh	0.66	2	8	0	0	10
Bihar	0.00	12	0	0	0	12
Gujarat	1.00	0	7	0	0	7
Haryana	0.85	0	0	0	5	5
Karnataka	1.00	0	15	0	0	15
Madhya Pradesh	0.10	14	1	0	0	15
Maharashtra	0.78	4	14	0	0	18
Orissa	0.32	6	2	0	0	8
Punjab	0.87	0	0	0	6	6
Rajasthan	0.00	1	0	0	0	1
Tamil Nadu	0.75	2	9	0	0	11
Uttar Pradesh	0.42	0	0	12	35	47
West Bengal	0.00	11	0	0	0	11
Total	0.51	52	56	12	46	166

Notes: This table lists only districts that used to be part of British India. Areas where the British did not set up the land revenue system are excluded. Districts of British India currently in Pakistan, Bangladesh, or Burma are excluded. The table also excludes the states of Assam and Kerala, for which agricultural data are not available in the World Bank dataset. The table lists 1960 districts, some of which were split into two or more districts over time. We use unsplit districts in all our analyses.
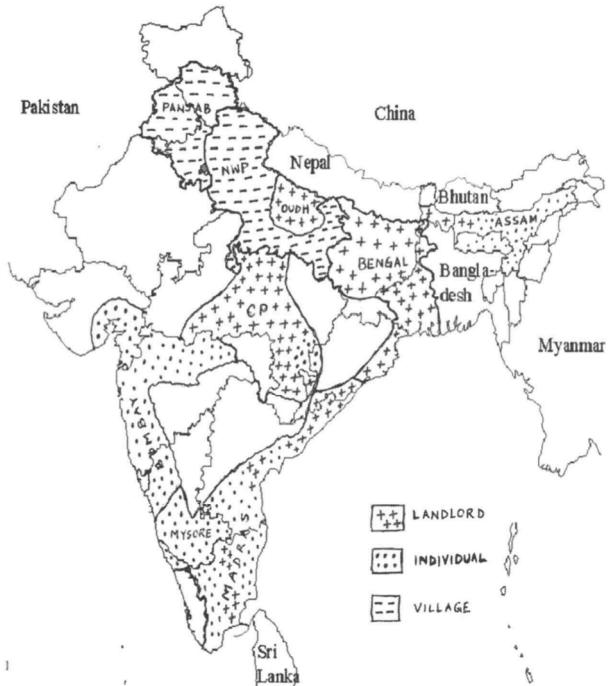
Pakistan

China

PANJAB

NWP

Nepal

OUDH

Bhutan

ASSAM

BENGAL

Bangla-
desh

CP

Myanmar

KHAMBA

MYSORE

+ + +
+ + + LANDLORD

·:·:· INDIVIDUAL

=-= VILLAGE

Sri
Lanka

TABLE 2—DIFFERENCES IN GEOGRAPHY AND DEMOGRAPHICS

		Mean	Standard deviation	Difference[a]	Standard error of difference
Geography					
Latitude		22.19	5.60	−4.35***	(0.961)
Altitude		366.41	148.14	93.64***	(25.98)
				—	
Mean annual rainfall (mm)		1263.09	471.64	373.99***	(80.83)
Coastal dummy		0.1497	0.3579	0.084	(0.065)
Top 2 soil types	Black soil	0.2096	0.4082	0.244***	(0.072)
	Alluvial soil	0.1677	0.3747	−0.135**	(0.067)
	Red soil	0.5689	0.4967	0.075	(0.090)
Top-soil depth	<25 cm	0.0181	0.1336	0.016	(0.024)
	25–50 cm	0.1145	0.3193	−0.076	(0.058)
	50–100 cm	0.2289	0.4214	0.193	(0.075)
	100–300 cm	0.0904	0.2876	0.135***	(0.051)
	>300 cm	0.5482	0.4991	−0.268***	(0.088)
Area share of various crops: 1956–1987					
Area share of rice		0.366	0.298	−0.194***	(0.054)
Area share of wheat		0.149	0.157	−0.058**	(0.026)
Area share of other cereals		0.205	0.172	0.128***	(0.031)
Area share of oilseeds		0.067	0.088	0.065***	(0.013)
Area share of cotton		0.041	0.096	0.066***	(0.018)
Area share of tobacco		0.003	0.015	0.005**	(0.002)
Area share of sugarcane		0.031	0.053	0.005	(0.008)
Cash crops-to-cereals ratio		0.149	0.257	0.152***	(0.048)
Demographics: 1961, 1971, 1981, 1991					
Log (Population)		14.26	0.634	−0.088	(0.109)
Population density		36.44	85.92	−11.22**	(4.02)
Proportion of scheduled castes		0.1598	0.0733	−0.034**	(0.014)
Proportion of scheduled tribes		0.0980	0.1630	−0.010	(0.031)
Proportion rural		0.8102	0.1237	−0.066***	(0.023)
Proportion of working population in farming		0.7119	0.1352	−0.050*	(0.027)

- Notes: LL better soil (typo rainfall sign negative), more rice and wheat, less cash crops, higher population density.

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

- Worrisome (but a good paper has to go out on a limb):

  - Existing presence of landlord class could have informed choices.

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

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

- **Specification:**

- $y_{it} = A + \alpha_t + \beta \mathsf{NL}_i + \gamma X_{it} + \epsilon_{it}$, where:

  - $i =$ district, but errors ϵ_{it} clustered at the regional level.

  - y_{it}: % irrigated area, fertilizer/hectare, % under HYV, crop yields, schools and health centers,

  - α_t is year effect, no state-level fixed effect (in base spec) because within-state variation in NL is low.

  - NL is measure of non-landlord system, both continuous and binary versions.

  - X_{it}: controls (latitude, altitude, soil, rainfall, time under British rule).

- Endogeneity concerns: (a) neighboring districts, (b) IV: conquest between 1820–1856.

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		Coefficient on non-landlord dummy	
		OLS Full sample (1)	OLS Excluding Bengal and Bihar (2)	OLS Full sample (3)	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
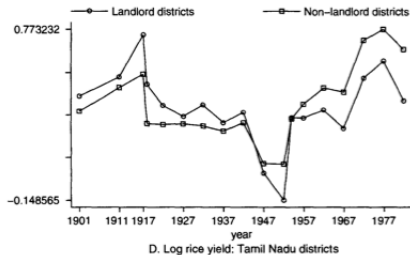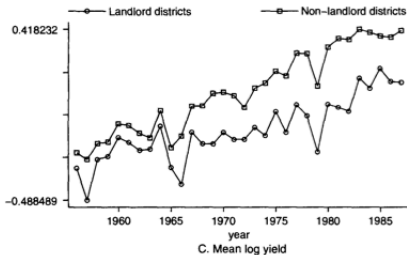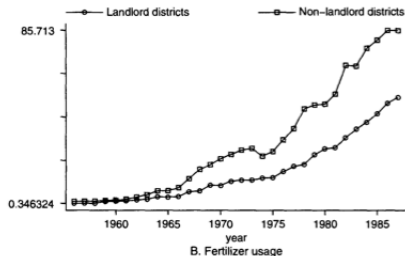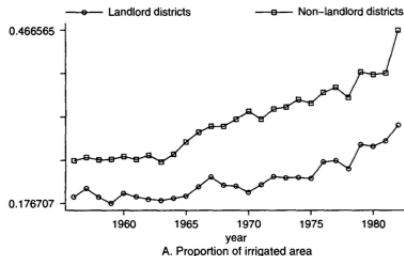Dependent variable: Non-landlord proportion

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

- Results: main channel appears to be agricultural investment.

  - Controlling for irrigation, adoption of HYV and fertilizer use, NL has no further impact on yields.

TABLE 5—ARE YIELDS EXPLAINED BY INVESTMENTS?

	Dependent variables		
	Log total yield OLS (1)	Log rice yield OLS (2)	Log wheat yield OLS (3)
Proportion non-landlord	0.035	0.070	0.109
	(0.053)	(0.063)	(0.063)
Proportion of gross cropped area irrigated	0.693**	0.439**	0.435**
	(0.112)	(0.096)	(0.117)
Fertilizer use (kg/ha)	0.007**	0.004**	0.001
	(0.001)	(0.001)	(0.001)
Percent area under HYV	4.274**	0.580**	0.618**
	(1.122)	(0.063)	(0.070)
Adjusted R-squared	0.60	0.52	0.56
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

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

A. Proportion of irrigated area

B. Fertilizer usage

C. Mean log yield

D. Log rice yield: Tamil Nadu districts

■ 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 | | Difference (3) |
	1956–1965 (1)	After 1965 (2)	
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."
  - Next table argues that once we control for state development expenditure per capita, the non-LL diffs become insignificant or come down in magnitude.

TABLE 7—IMPACT OF STATE POLICY

| Dependent variables | Mean of dependent variable | Coefficient on non-landlord proportion | | |
		OLS Base specification (1)	OLS Control for state dev exp per capita (2)	OLS State FE (3)
Panel A: Agricultural investments				
Proportion of gross cropped area irrigated	0.276	0.065*	0.074**	0.028
		(0.034)	(0.035)	(0.036)
Fertilizer use (kg/ha)	24.64	10.708***	10.805***	4.297
		(3.345)	(3.717)	(3.308)
Proportion of rice area under HYV	0.298	0.079*	0.007	0.000
		(0.044)	(0.040)	(0.042)
Proportion of wheat area under HYV	0.518	0.092**	0.061	0.028
		(0.046)	(0.047)	(0.039)
Proportion of other cereals area under HYV	0.196	0.057*	0.025	0.043*
		(0.031)	(0.030)	(0.026)
Panel B: Agricultural productivity				
log (yield of 15 major crops)		0.157**	0.174**	0.059
		(0.071)	(0.076)	(0.072)
log (rice yield)		0.171**	0.083	0.016
		(0.081)	(0.082)	(0.078)
log (wheat yield)		0.229***	0.243***	0.150***
		(0.067)	(0.072)	(0.045)
Panel C: Education and health investments, 1981				
Proportion of villages having:				
Primary school	0.745	0.154***	0.062*	0.102***
		(0.036)	(0.037)	(0.039)
Middle school	0.204	0.125***	0.093***	0.064***
		(0.023)	(0.021)	(0.018)
High school	0.082	0.052***	0.019	0.030**
		(0.018)	(0.014)	(0.013)
Primary health center	0.023	0.011***	0.002	0.012***
		(0.004)	(0.004)	(0.004)
Primary health subcenter	0.031	0.033***	0.011	0.006
		(0.011)	(0.009)	(0.006)
Panel D: Education and health outcomes				
Literacy rate (1961, 1971, 1981, 1991)	0.2945	0.0524**	0.0290*	0.0241
		(0.0190)	(0.0171)	(0.0176)
Infant mortality rate (1991)	82.17	−32.71***	−25.43***	−15.81***
		(5.38)	(5.28)	(5.40)
State fixed effects		NO	NO	YES
Year fixed effects		YES	YES	YES
Geographic controls		YES	YES	YES
Date of British land revenue control		YES	YES	YES

Summary

- Initial history conditions subsequent development.

- That happens when history affects behavior in persistent ways.

- Diminishing returns is one leading example in which this does not happen.

- But it is about the only example.

- We showed how increasing returns resurrects history.

- So do institutions, the status quo, and the social determinants of preferences.

- History-dependence is the rule rather than the exception.

- Understanding this in specific contexts is key to understanding underdevelopment.