Economics 210A
Spring 2015

Christina Romer
David Romer

LECTURE 5
Institutions, Culture, and Growth

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I. Overview

A Fundamental Question: Why Isn't the Whole World Developed?

- Industrialization spread rapidly to some areas.
- Technology is portable (non-rival).
- So are institutions.

Three Broad Possibilities

- Direct effects of geography.
- Institutions.
- Culture.
- Other? (Human capital? "Policies" rather than institutions?)

If the Answer Isn't Geography, Ideally We'd Like to Dig Deeper: Where Do Variations in Institutions or Culture Come from?

- Geography.
- Historical accident.
- Ideas.
- …
- And: Why do the differences persist?

Today's Papers

- AJR: Geography → Institutions → Development.
- Nunn: Geography (and historical accident?) → Slave trade → Institutions (and perhaps culture) → Development.
- Clark: Culture → Development.

II. Daron Acemoglu, Simon Johnson, and James Robinson

"The Colonial Origins of Comparative Development: An Empirical Investigation"

AJR's Thesis

- Settler mortality affected colonialization strategy, which affected institutions.
- These institutional differences have persisted.
- Engerman and Sokoloff advance similar ideas; but they focus on conduciveness to slave agriculture rather than the disease environment.

AJR's Basic Empirical Strategy

- In a sample of former colonies, regress income per capital today on institutions today, instrumenting with settler mortality.
- "This identification strategy will be valid as long as … mortality rates of settlers between the seventeenth and nineteenth centuries have no effect on income today other than through their influence on institutional development" (AJR, p. 1383).
- No!! The key issue is whether settler mortality is correlated with determinants of income today other than institutions.

AJR's Qualitative Evidence

- Mortality influenced settlement patterns.
- Colonizers adopted very different strategies in different places: "settler colonies" vs. "extractive states."
- Institutions had considerable persistence.
- Evaluation?

OLS

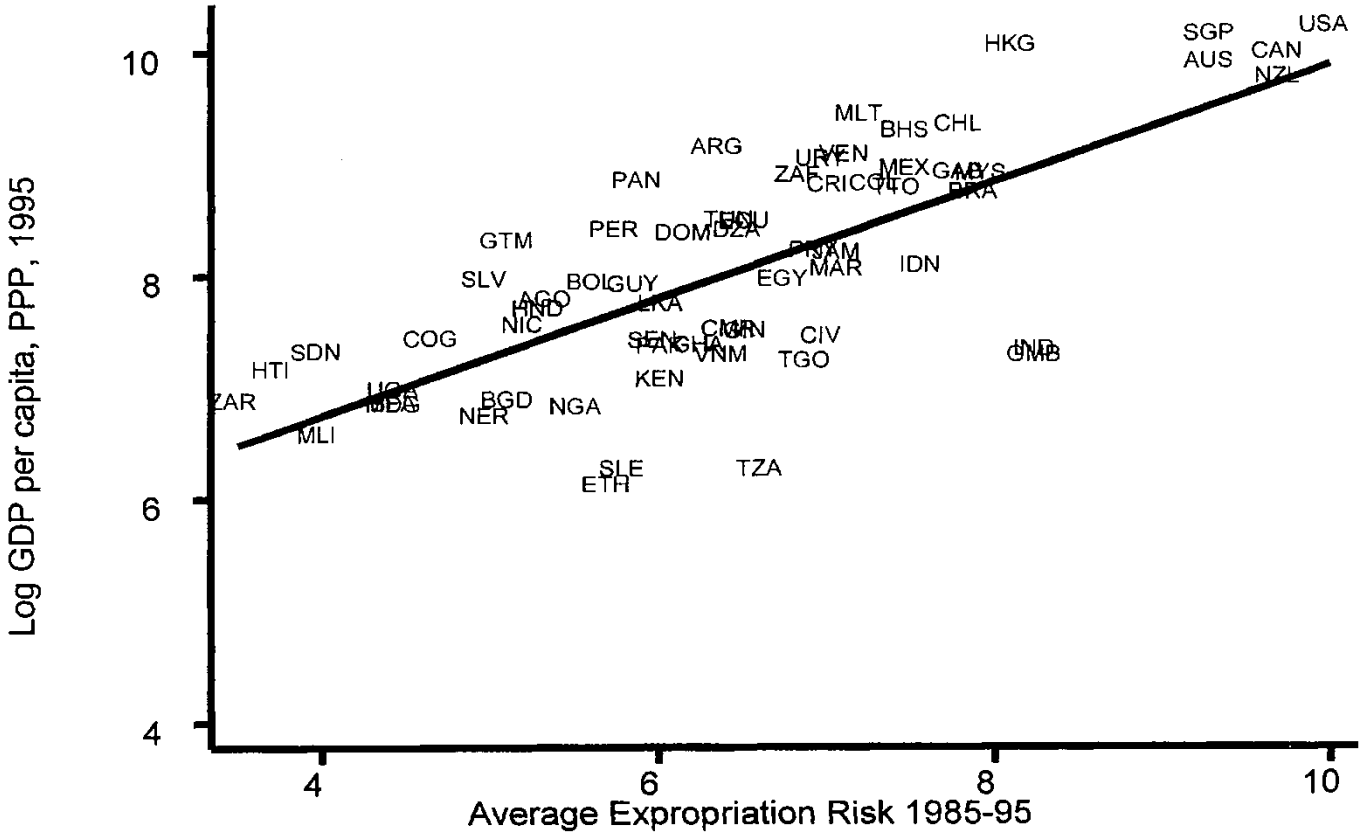


FIGURE 2. OLS RELATIONSHIP BETWEEN EXPROPRIATION RISK AND INCOME

From: AJR, "The Colonial Origins of Comparative Development"

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.

From: AJR, "The Colonial Origins of Comparative Development"

Data on Potential Settler Mortality

- Mainly death rates of soldiers (not from battle).
- For Latin America, mainly based on death rates of bishops, adjusted to reflect higher death rates of soldiers.
- Deaths were largely from disease, especially malaria and yellow fever.
- AJR argue that the diseases had much smaller effects on local populations.

IV – First Stage

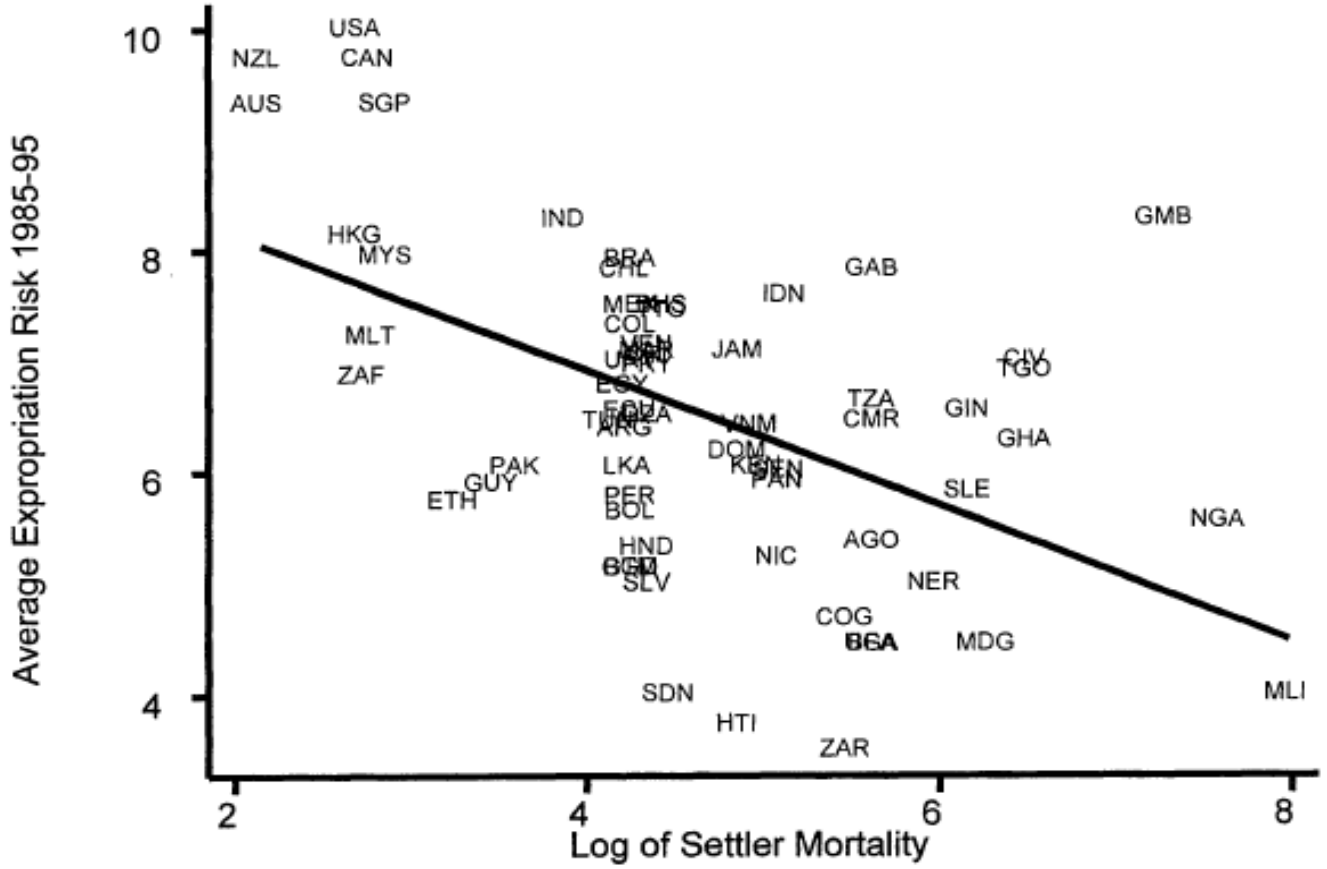


FIGURE 3. FIRST-STAGE RELATIONSHIP BETWEEN SETTLER MORTALITY AND EXPROPRIATION RISK

From: AJR, "The Colonial Origins of Comparative Development"

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	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
Panel C: Ordinary Least Squares									
Average protection against expropriation risk 1985–1995	0.52	0.47	0.49	0.47	0.48	0.47	0.42	0.40	0.46
	(0.06)	(0.06)	(0.08)	(0.07)	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)
Number of observations	64	64	60	60	37	37	64	64	61

From: AJR, "The Colonial Origins of Comparative Development"

Discussion

- Latitude and Africa dummy (vs. Americas) are insignificant (!).
- OLS vs. IV: Can measurement error – broadly defined – plausibly explain why the IV estimates are so much larger?
- If the measurement error is classical, $\hat{b}_{OLS} = \frac{V_X}{V_X + V_u} b_{TRUE}$, where V_X and V_u are the variances of the "true" *X* and of the measurement error.
- Implied economic importance from the IV estimate?

Candidates for Omitted Variables Correlated with the Instrument

- Identity of the colonizer.
- Legal origins.
- Religion.
- Weather.
- Suitability for agriculture.
- Modern disease environment.
- Effects of the slave trade operating through culture rather than institutions.
- Human capital accumulation.
- More?

TABLE 6—ROBUSTNESS CHECKS FOR IV REGRESSIONS OF LOG GDP PER CAPITA

	Base sample (1)	Base sample (2)	Base sample (3)	Base sample (4)	Base sample (5)	Base sample (6)	Base sample (7)	Base sample (8)	Base sample (9)
Panel A: Two-Stage Least Squares									
Average protection against expropriation risk, 1985–1995	0.84 (0.19)	0.83 (0.21)	0.96 (0.28)	0.99 (0.30)	1.10 (0.33)	1.30 (0.51)	0.74 (0.13)	0.79 (0.17)	0.71 (0.20)
Latitude		0.07 (1.60)		−0.67 (1.30)		−1.30 (2.30)		−0.89 (1.00)	−2.5 (1.60)
p-value for temperature variables	[0.96]	[0.97]							[0.77]
p-value for humidity variables	[0.54]	[0.54]							[0.62]
Percent of European descent in 1975			−0.08 (0.82)	0.03 (0.84)					0.3 (0.7)
p-value for soil quality					[0.79]	[0.85]			[0.46]
p-value for natural resources					[0.82]	[0.87]			[0.82]
Dummy for being landlocked					0.64 (0.63)	0.79 (0.83)			0.75 (0.47)
Ethnolinguistic fragmentation							−1.00 (0.32)	−1.10 (0.34)	−1.60 (0.47)
Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995									
Log European settler mortality	−0.64 (0.17)	−0.59 (0.17)	−0.41 (0.14)	−0.4 (0.15)	−0.44 (0.16)	−0.34 (0.17)	−0.64 (0.15)	−0.56 (0.15)	−0.59 (0.21)
Latitude		2.70 (2.00)		0.48 (1.50)		2.20 (1.50)		2.30 (1.40)	4.20 (2.60)
R^2	0.39	0.41	0.34	0.34	0.41	0.43	0.27	0.30	0.59

From: AJR, "The Colonial Origins of Comparative Development"

TABLE 7—GEOGRAPHY AND HEALTH VARIABLES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	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 (0.25)	0.72 (0.30)	0.63 (0.28)	0.68 (0.34)	0.55 (0.24)	0.56 (0.31)	0.69 (0.26)	0.74 (0.24)	0.68 (0.23)	0.91 (0.24)	0.90 (0.32)
Latitude		−0.57 (1.04)		−0.53 (0.97)		−0.1 (0.95)					
Malaria in 1994	−0.57 (0.47)	−0.60 (0.47)					−0.62 (0.68)				
Life expectancy			0.03 (0.02)	0.03 (0.02)				0.02 (0.02)			
Infant mortality					−0.01 (0.005)	−0.01 (0.006)			−0.01 (0.01)		
	Panel B: First Stage for Average Protection Against Expropriation Risk in 1985–1995										
Log European settler mortality	−0.42 (0.19)	−0.38 (0.19)	−0.34 (0.17)	−0.30 (0.18)	−0.36 (0.18)	−0.29 (0.19)	−0.41 (0.17)	−0.40 (0.17)	−0.40 (0.17)		
Latitude		1.70 (1.40)		1.10 (1.40)		1.60 (1.40)	−0.81 (1.80)	−0.84 (1.80)	−0.84 (1.80)		
Malaria in 1994	−0.79 (0.54)	−0.65 (0.55)									
Life expectancy			0.05 (0.02)	0.04 (0.02)							
Infant mortality					−0.01 (0.01)	−0.01 (0.01)					
Mean temperature							−0.12 (0.05)	−0.12 (0.05)	−0.12 (0.05)		
Distance from coast							0.57 (0.51)	0.55 (0.52)	0.55 (0.52)		
Yellow fever dummy										−1.10 (0.41)	−0.81 (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

From: AJR, "The Colonial Origins of Comparative Development"

Other Issues

- Concerns abut the data: Albouy (2012 and others) vs. AJR (2012 and others).

- Are the intermediate steps (e.g., institutions in 1900 and at time of independence) strong enough?

TABLE 3—DETERMINANTS OF INSTITUTIONS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A	Dependent Variable Is Average Protection Against Expropriation Risk in 1985–1995									
Constraint on executive in 1900	0.32	0.26								
	(0.08)	(0.09)								
Democracy in 1900			0.24	0.21						
			(0.06)	(0.07)						
Constraint on executive in first year of independence					0.25	0.22				
					(0.08)	(0.08)				
European settlements in 1900							3.20	3.00		
							(0.61)	(0.78)		
Log European settler mortality									−0.61	−0.51
									(0.13)	(0.14)
Latitude		2.20		1.60		2.70		0.58		2.00
		(1.40)		(1.50)		(1.40)		(1.51)		(1.34)
R^2	0.2	0.23	0.24	0.25	0.19	0.24	0.3	0.3	0.27	0.3
Number of observations	63	63	62	62	63	63	66	66	64	64

Panel B	Dependent Variable Is Constraint on Executive in 1900				Dependent Variable Is Democracy in 1900				Dependent Variable Is European Settlements in 1900	
European settlements in 1900	5.50	5.40			8.60	8.10				
	(0.73)	(0.93)			(0.90)	(1.20)				
Log European settler mortality			−0.82	−0.65			−1.22	−0.88	−0.11	−0.07
			(0.17)	(0.18)			(0.24)	(0.25)	(0.02)	(0.02)
Latitude		0.33		3.60		1.60		7.60		0.87
		(1.80)		(1.70)		(2.30)		(2.40)		(0.19)
R^2	0.46	0.46	0.25	0.29	0.57	0.57	0.28	0.37	0.31	0.47
Number of observations	70	70	75	75	67	67	68	68	73	73

From: AJR, "The Colonial Origins of Comparative Development"

Conclusion

III. Nathan Nunn

"The Long-Term Effects of Africa's Slave Trades"

Nunn's Thesis

- The legacy of the slave trade adversely affects African economic development today.

Data Construction

- Shipping data provide estimates of number of slaves shipped from each coastal country of Africa.
- Some samples show ethnic composition of slaves (but usually not where they were shipped from).
- Assumes that “slaves shipped from a port within a country are either from that country or from countries directly to the interior.”

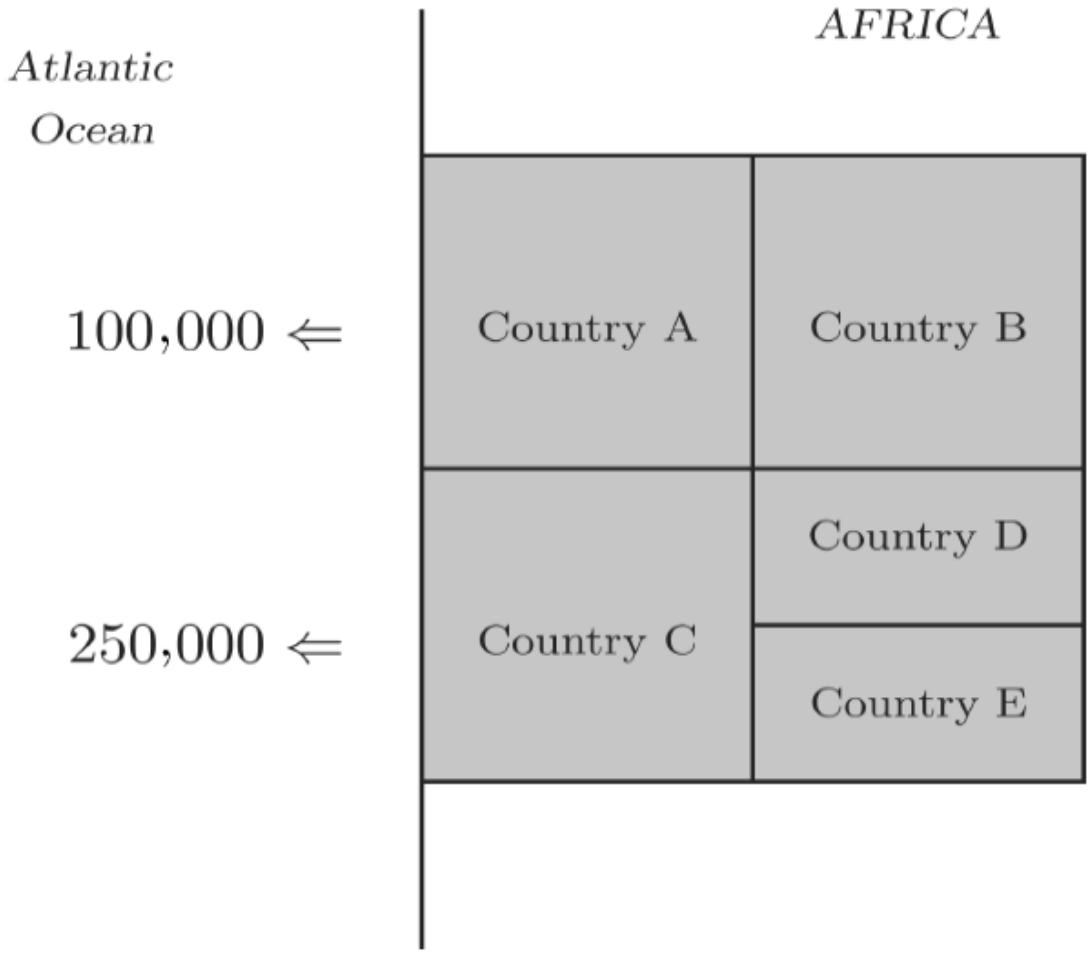


FIGURE I
An Artificial Map of the West Coast of Africa

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

Possible Sources of Measurement Error

- Misassignment from his imputation procedure.
- Underestimation of slaves from the interior (because of higher mortality rates).
- Errors arising from small numbers of samples showing ethnicities.

TABLE II

ESTIMATED TOTAL SLAVE EXPORTS BETWEEN 1400 AND 1900 BY COUNTRY

Isocode	Country name	Trans-Atlantic	Indian Ocean	Trans-Saharan	Red Sea	All slave trades
AGO	Angola	3,607,020	0	0	0	3,607,020
NGA	Nigeria	1,406,728	0	555,796	59,337	2,021,859
GHA	Ghana	1,614,793	0	0	0	1,614,793
ETH	Ethiopia	0	200	813,899	633,357	1,447,455
SDN	Sudan	615	174	408,261	454,913	863,962
MLI	Mali	331,748	0	509,950	0	841,697
ZAR	Democratic Republic of Congo	759,468	7,047	0	0	766,515
MOZ	Mozambique	382,378	243,484	0	0	625,862
TZA	Tanzania	10,834	523,992	0	0	534,826
TCD	Chad	823	0	409,368	118,673	528,862
[...]						
MAR	Morocco	0	0	0	0	0
RWA	Rwanda	0	0	0	0	0
STP	São Tomé & Principe	0	0	0	0	0
SWZ	Swaziland	0	0	0	0	0
SYC	Seychelles	0	0	0	0	0
TUN	Tunisia	0	0	0	0	0

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

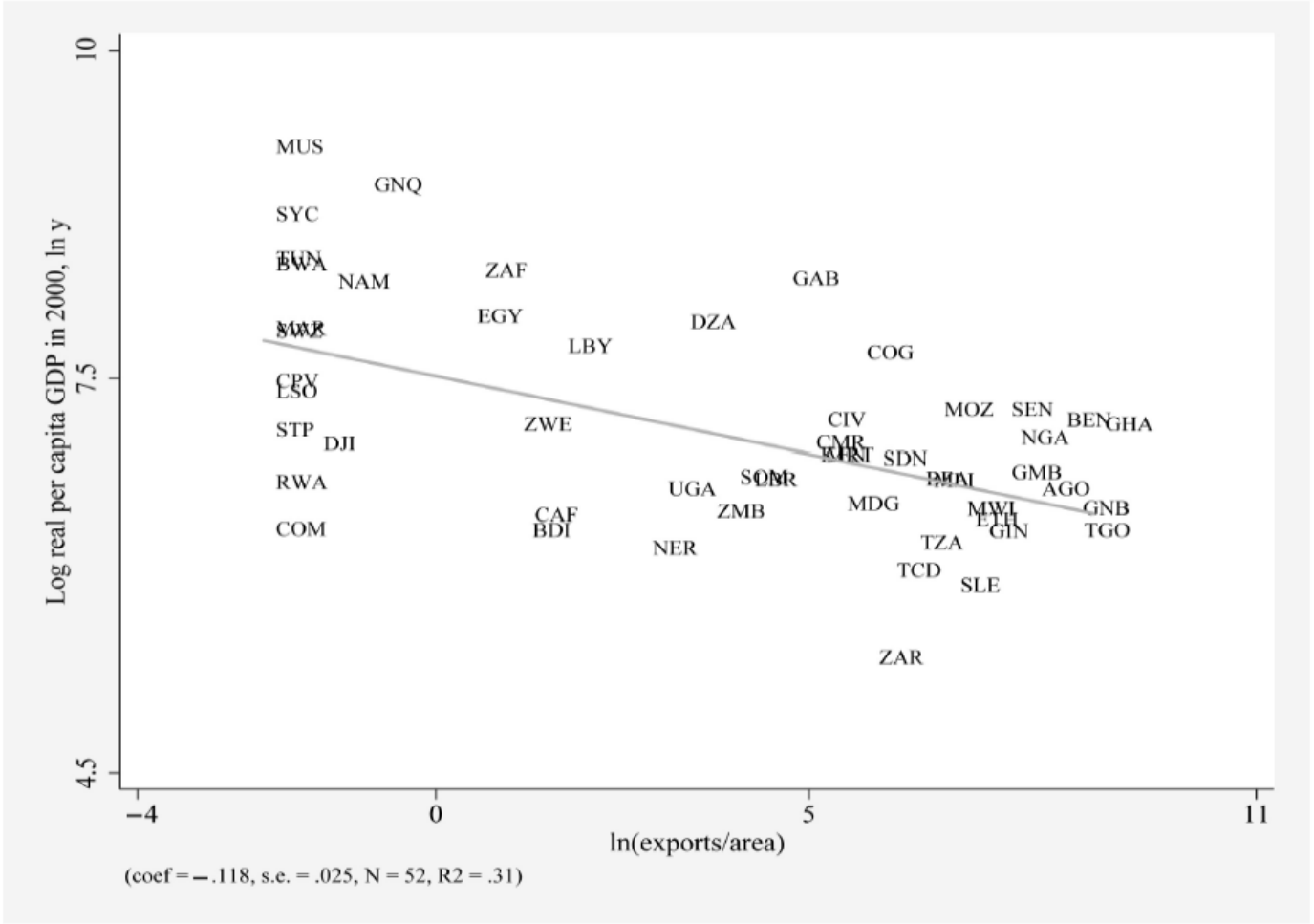


FIGURE III
Relationship between Log Slave Exports Normalized by Land Area, ln(exports/area), and Log Real Per Capita GDP in 2000, ln y

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

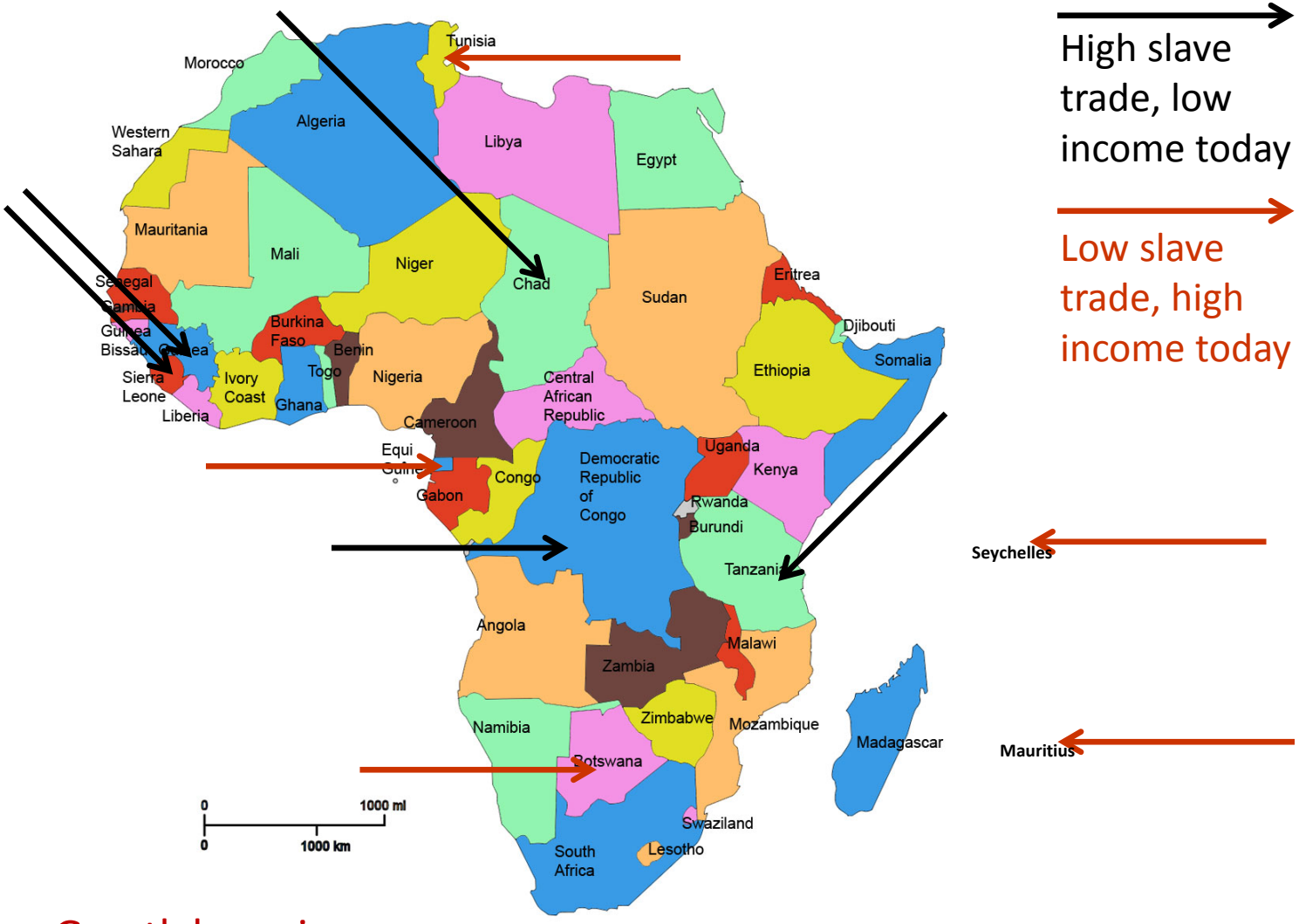
TABLE III

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)
[...]						
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

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

Some Influential Observations in Figure III



Map from: Greatlakesvoice.com

Possible Biases?

- Perhaps less developed areas were more affected by the slave trade.
- Perhaps more developed areas were more affected by the slave trade, and the greater development harmed them in the long run for reasons unrelated to the slave trade. (AJR, "Reversal of Fortune" *QJE*, 2002.)
- Non-classical measurement error?
- More?

Instruments

- “The sailing distance from the point on the coast that is closest to the country’s centroid to the closest major market of the Atlantic slave trade.”
- “The sailing distance from the point on the coast that is closest to the country’s centroid to the closest of the two major slave destinations of the Indian Ocean slave trade.”
- “The overland distance from a country’s centroid to the closest port of export for the trans-Saharan slave trade.”
- “The overland distance from a country’s centroid to the closest port of export for the Red Sea slave trade.”

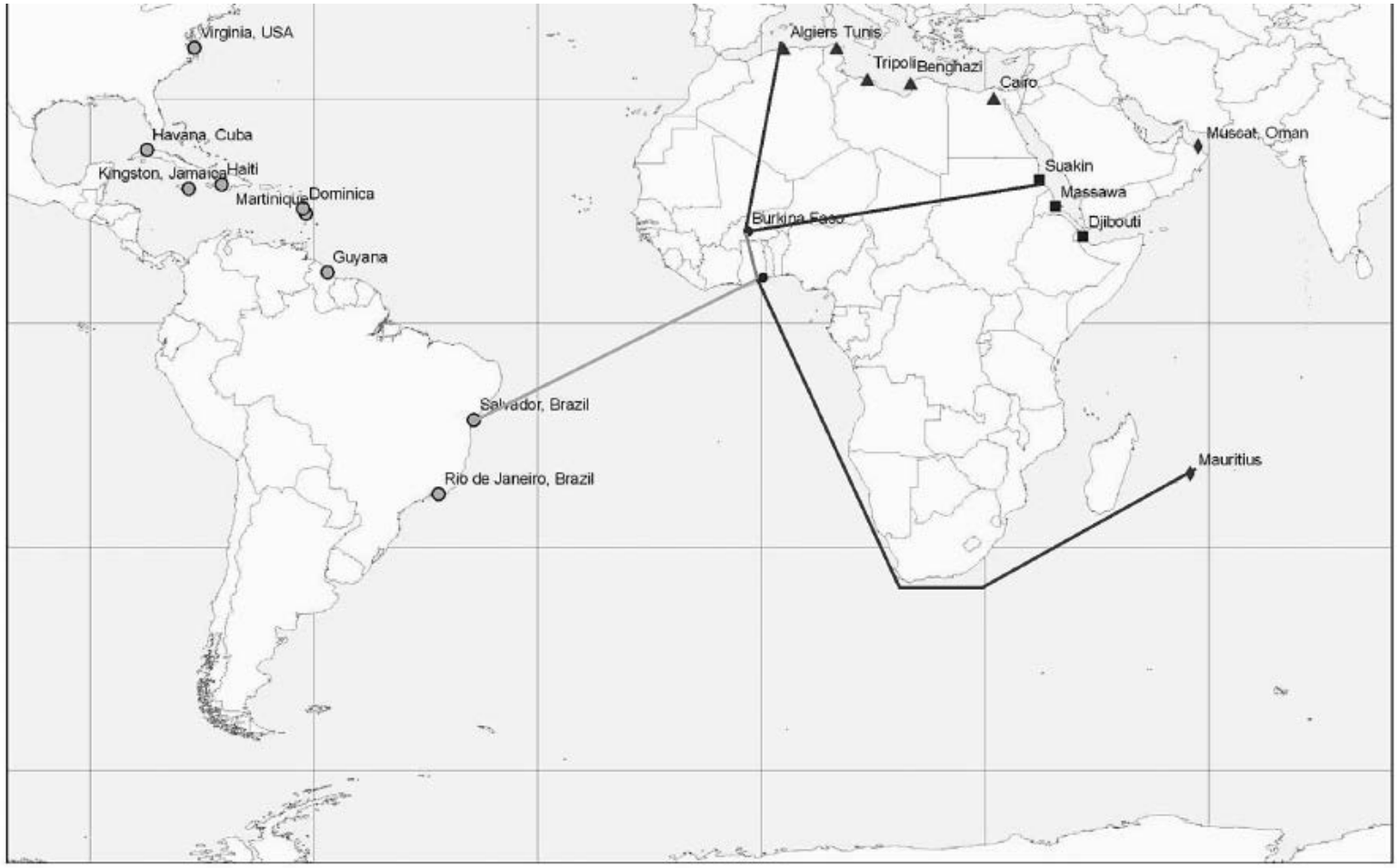


FIGURE V

Example Showing the Distance Instruments for Burkina Faso

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

TABLE IV

ESTIMATES OF THE RELATIONSHIP BETWEEN SLAVE EXPORTS AND INCOME

	(1)	(2)	(3)	(4)
[...]				
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

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

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)
	$[-0.51, -0.14]$	$[-0.42, -0.13]$	$[-\infty, +\infty]$	$[-0.62, -0.12]$
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

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

Qualitative Evidence and Mechanisms

- Slave trade lasted for about 500 years; formal colonial rule for about 75.
- Impact on ethnic fractionalization.
- Impact on state development.
- Impact on trust (Nunn and Wantchekon, *AER*, 2011).

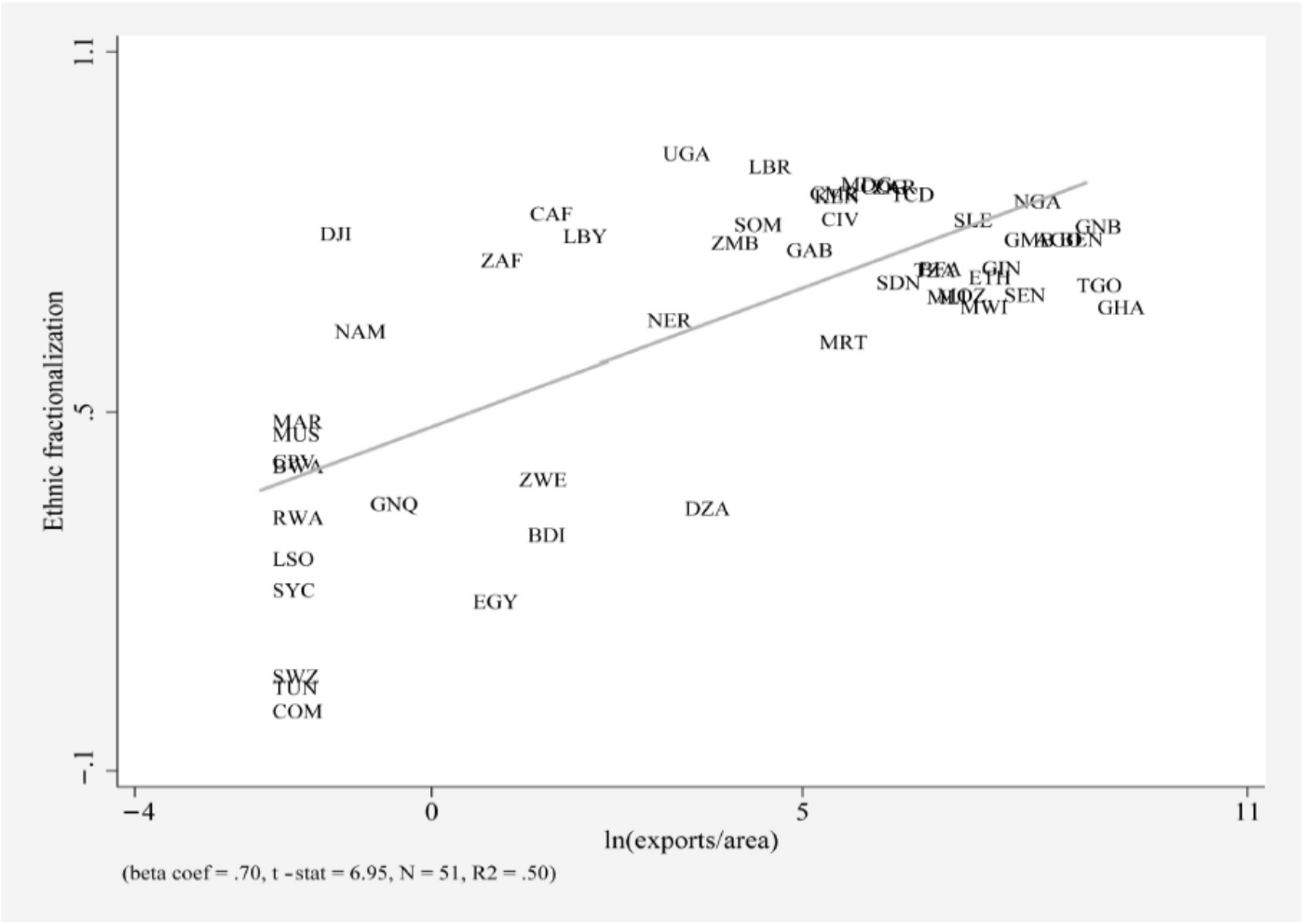


FIGURE VI
Relationship between Slave Exports and Current Ethnic Fractionalization

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

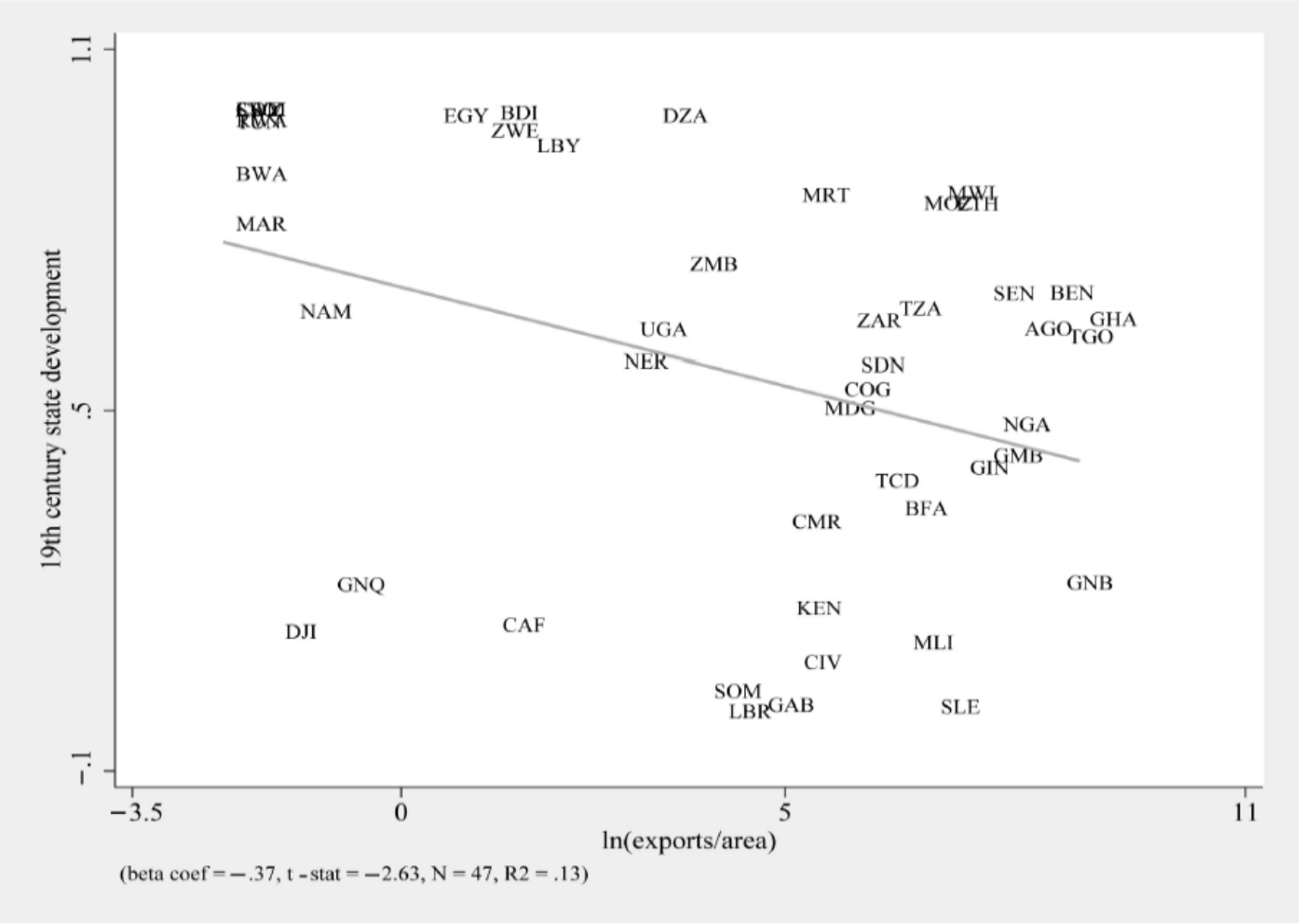


FIGURE VII
Relationship between Slave Exports and Nineteenth-Century State Development

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

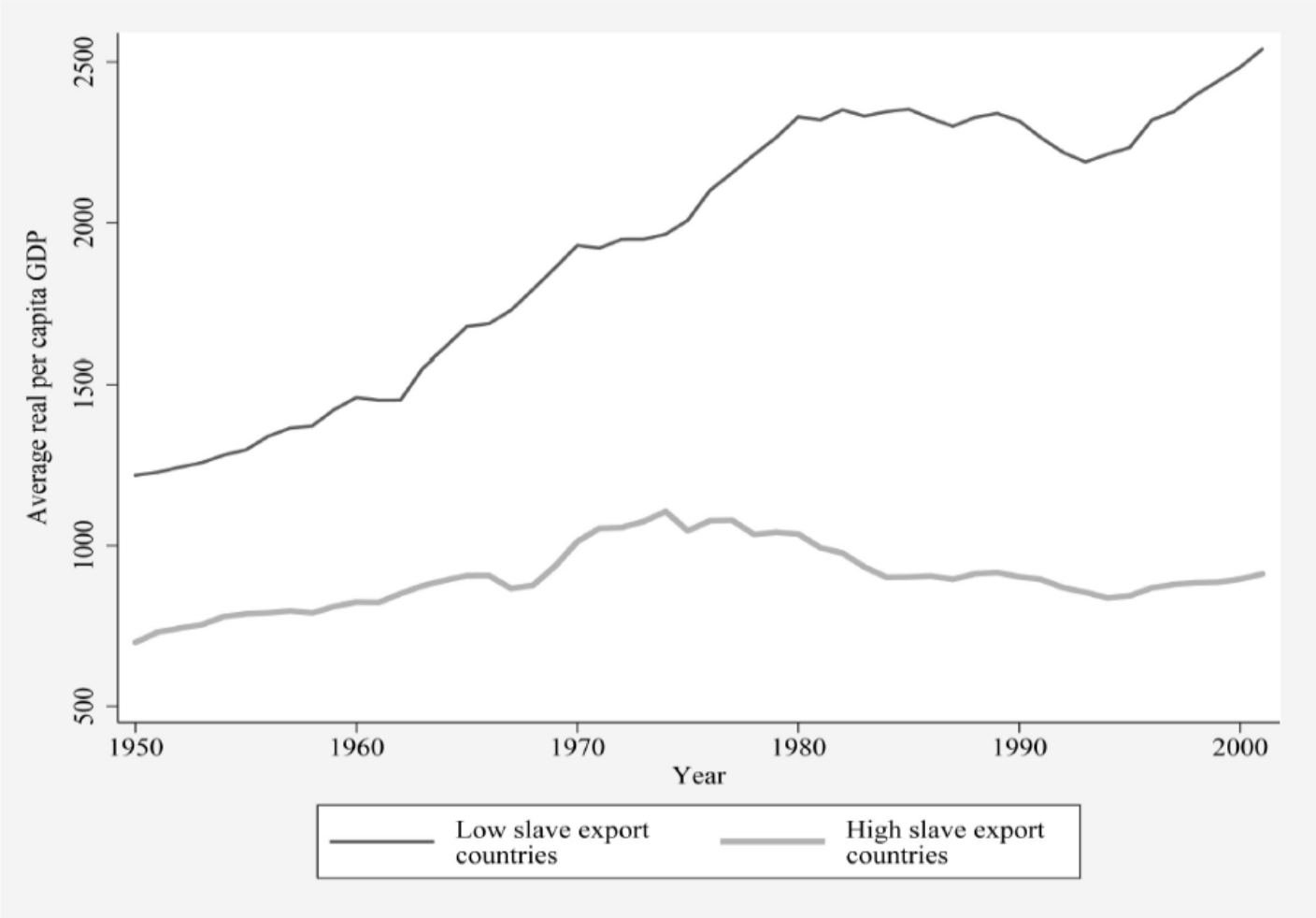


FIGURE VIII
Paths of Economic Development Since 1950

From: Nunn, "The Long-Term Effects of Africa's Slave Trades"

Conclusion

IV. Gregory Clark

"Why Isn't the Whole World Developed? Lessons from the Cotton Mills"

Overview of Clark

- Uses cotton textiles as a case study.
- Attempts to show that there were large differences in labor efficiency across countries.
- Investigates the possible factors that could explain this.
- Concludes that the source of the difference was local culture.

Textiles as a Case Study

- Strengths
    - Major industry, plentiful data, common across countries.
- Weaknesses
    - Might not be representative, data come from countries at different stages of industrialization.

Two Approaches to Deducing Labor Efficiency

- Approach 1: Look at relative costs and trade.
- Approach 2: Look directly at staffing levels per machine.

A. Approach 1 to Showing that Labor Was More Efficient in Britain

- Argue that higher wages would have put Britain at a huge competitive disadvantage if British workers weren't more efficient.

TABLE 1

COTTON TEXTILE COSTS AND PROFITS AS IMPLIED BY INPUT PRICES, c.1910

Country or Region	Weekly Wage Rate	Plant and Machinery (dollar/spindle)	Coal (dollar/ton)	Manufacturing Cost (England = 1.00)	Implied Profit Rate
New England	$8.8	$17.43	$3.80	1.59	−8.9%
United States (South)	6.5	17.43	3.80	1.30	−0.7
England	5.0	12.72	2.50	1.00	8.0
Germany	3.8	18.48	4.88	1.00	7.9
France	3.7	16.54	4.67	0.95	9.5
Switzerland	3.7	24.80	6.62	1.15	4.7
Austro-Hungary	2.8	16.38	5.75	0.85	12.6
Spain	2.7	19.33	6.50	0.91	10.5
Mexico	2.6	19.27	10.00	0.94	9.6
Russia	2.4	20.69	7.20	0.91	10.3
Italy	2.4	16.00	7.25	0.81	13.8
Portugal	1.72	17.50	7.00	0.76	15.0
Japan	0.80	24.57	2.58	0.73	14.1
India	0.78	17.56	5.02	0.61	19.1
China	0.54	16.32	3.25	0.53	22.1
Share in costs in England	0.618	0.124	0.034		

From: Clark, “Why Isn’t the Whole World Developed?”

TABLE 2

IMPLIED PROFIT RATES IN COTTON TEXTILES ADJUSTING FOR CAPITAL UTILIZATION, c.1910

Country or Region	Capital per Spindle	Hours per Year	Adjusted Capital per Spindle	Manufacturing Cost (England = 1.00)	Implied Profit Rate
New England	$18.60	3000	$17.62	1.57	−9.4%
United States (South)	18.60	3450	16.04	1.26	−0.8
England	15.06	2775	15.06	1.00	8.0
Germany	19.38	3000	18.35	0.99	8.3
France	17.93	3300	15.96	0.92	10.7
Switzerland	24.12	3250	21.41	1.10	5.3
Austro-Hungary	17.81	3300	15.86	0.83	14.1
Spain	20.02	4455	14.56	0.84	14.4
Mexico	19.98	6750	11.47	0.82	16.6
Russia	21.04	4061	16.13	0.84	13.5
Italy	17.52	3150	16.10	0.79	15.0
Portugal	18.65	3300	16.56	0.74	16.9
Japan	23.95	6526	13.36	0.62	25.2
India	18.70	3744	15.29	0.58	23.4
China	17.76	5302	11.93	0.48	32.9

From: Clark, “Why Isn’t the Whole World Developed?”

Do you find this argument compelling?

B. Approach 2 to Showing that Labor Was More Efficient in Britain

- Look at number of machines a worker tended in various countries as a measure of efficiency.

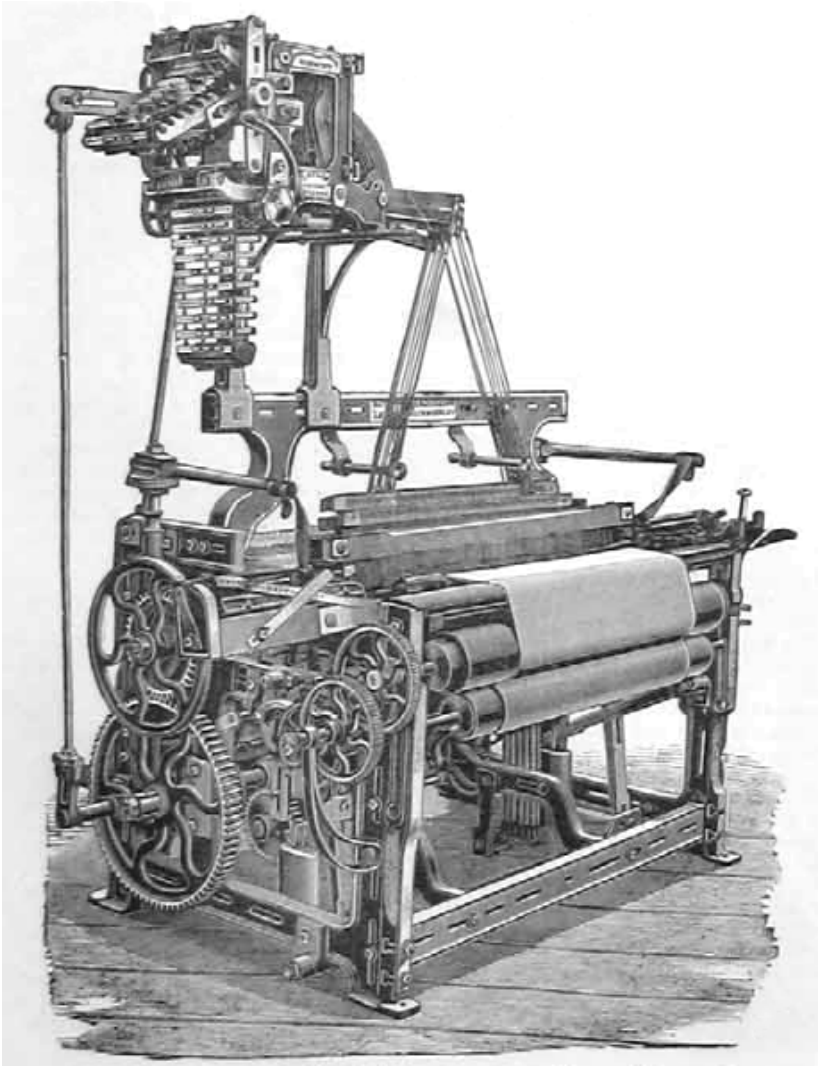
Ring Spinning (1920s)

TABLE 4
MACHINES PER OPERATIVE, c.1910

Country or Region	Average Weekly Wage	Loom-Equivalents per Worker	Index of Machines per Worker	Ring Spindles per Worker	Plain Looms per Worker
New England	$8.8	2.97	1.55	902	8.0
Canada	8.8	2.53	1.41	750	6.0
United States (South)	6.5	2.65	1.44	770	6.0
Britain	5.0	2.04	1.00	625	3.8
Germany	3.8	1.28	0.63	327	2.9
France	3.7	1.11	0.81	500	2.8
Switzerland	3.7	1.40	0.70	450	2.7
Austro-Hungary	2.8	1.24	0.65	403	2.8
Spain	2.7	0.91	0.73	450	2.0
Mexico	2.6	1.15	0.77	540	2.5
Russia	2.4	1.10	0.77	450	2.0
Italy	2.4	0.88	0.76	436	2.0
Portugal	1.72	0.88	0.65	384	2.0
Egypt	1.69	0.81	0.39	240	1.5
Greece	1.38	0.46			
Japan	0.80	0.53	0.52	190	1.6
India	0.78	0.50	0.33	214	1.9
China	0.54	0.48	0.34	168	1.5
Peru		1.17	0.78	391	3.5
Brazil		0.88	0.67	527	3.0

From: Clark, “Why Isn’t the Whole World Developed?”

Power Loom (1890)



Textile Mill

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TABLE 3
IMPLIED COSTS AND PROFITS IN COTTON TEXTILES ADJUSTING FOR WORKER EFFICIENCIES, c.1910

Country or Region	Weekly Wage Rate	Machinery per Worker (loom-equivalent)	Corrected Yearly Labor Cost	Manufacturing Cost (England = 1.00)	Implied Profit Rate
New England	$8.8	2.97	$6.04	1.25	0.9%
Canada	8.8	2.53	7.10		
United States (South)	6.5	2.65	5.00	1.12	4.6
England	5.0	2.04	5.00	1.00	8.0
Germany	3.8	1.28	6.06	1.28	0.1
France	3.7	1.11	6.80	1.33	−1.9
Switzerland	3.7	1.40	5.39	1.36	0.0
Austro-Hungary	2.8	1.24	4.61	1.07	5.8
Spain	2.7	0.91	6.05	1.32	−0.7
Mexico	2.6	1.15	4.61	1.19	2.9
Russia	2.4	1.10	4.45	1.16	3.8
Italy	2.4	0.88	5.56	1.20	1.8
Portugal	1.72	0.88	3.99	1.04	7.0
Egypt	1.69	0.81	4.26		
Greece	1.38	0.46	6.12		
Japan	0.80	0.53	3.08	1.01	7.7
India	0.78	0.50	3.18	0.91	10.6
China	0.54	0.48	2.30	0.75	15.5

From: Clark, “Why Isn’t the Whole World Developed?”

C. What Might Explain the Different Staffing Levels We Observe?
Explanations Not Related to Labor Itself

Can the different staffing levels be explained by capital-labor substitution?

- Only makes sense to use more labor if it allowed foreign mills to save on other inputs, such as capital.
- Yet, we see higher staffing levels in areas where substituting labor for capital wasn't a possibility (doffing).

Doffing (1911)

TABLE 5
OUTPUT PER MACHINE PER HOUR, c.1910

Country	Wage	Hourly Output per Spindle (in ounces)	Hourly Output per Loom (in yards)
United States	$8.0	0.601 oz.	5.17 yd.
England	5.0	0.651	6.07
Austria	2.8	0.487	
Italy	2.4	0.670	
Japan	0.80	0.628	5.96
India	0.78	0.562	
China	0.54	0.515	4.01

- Low-wage countries were not getting great utilization of their capital except through running longer hours.

From: Clark, "Why Isn't the Whole World Developed?"

Can the different staffing levels be explained by raw material-labor substitution?

- Perhaps higher staffing levels made it possible to use lower-grade (cheaper) cotton.
- Yet, only a few high-staffing-level countries used low-grade cotton.

TABLE 6
RING YARN STRENGTH IN THE 1920s

Yarn Count	United States	Britain	Japan	India	China
10–19	100	91		60	80
20–29	100	100	79	74	82
30–39	100	115	115	97	110
40–49	100	119	101	95	115
50	100	122		95	
60	100	115		122	
70	100	107		125	
100	100			200	

- Japan, India, and China do not use poorer cotton in finer (higher) counts of yarn, yet they had higher staffing levels in those as well.

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Can the different staffing levels be explained by different technologies?

- Most mills were made of imported technology.
    - Installed by British engineers.
    - Often used British managers and skilled workers to train local workers.
- Later development abroad and fast growth likely implied technology was *newer*, not older.

D. What Might Explain the Different Staffing Levels We Observe? Explanations Focusing on Labor

- Are there characteristics of labor that made workers less productive outside of Britain?

Could lower labor efficiency be explained by less experience?

- Wage profiles were not steeply upward-sloping.
- How does Clark measure experience?
    - Thinks it is lower where textile industry is growing faster.

TABLE 7

GROWTH RATES, WORKER EXPERIENCE AND IMPLIED LABOR EFFICIENCY, 1910

Country or Region	Average Weekly Wage	Loom-Equivalents per Worker	Industry Growth Rate, 1890–1910	Average Years of Experience	Predicted Machines per Worker
New England	$8.8	2.97	1.6%	8.6	109
Canada	8.8	2.53	2.4	8.1	108
United States (South)	6.5	2.65	9.4	5.2	100
Lancashire	5.0	2.04	0.9	9.2	110
Germany	3.8	1.28	3.1	7.6	105
France	3.7	1.11	1.7	8.5	109
Switzerland	3.7	1.40	−0.4	10.4	113
Austro-Hungary	2.8	1.24	2.6	7.9	107
Spain	2.7	0.91	2.0	8.3	108
Mexico	2.6	1.15	2.5	8.0	107
Russia	2.4	1.10	4.2	7.0	104
Italy	2.4	0.88	5.4	6.5	103
Japan	0.80	0.53	9.6	5.1	100
India	0.78	0.50	5.1	6.6	103
China	0.54	0.48	10.0	5.0	100
Brazil		0.88	11.3	4.7	99

From: Clark, “Why Isn’t the Whole World Developed?”

Could lower labor efficiency be explained by lower inherent labor quality?

- Poor nutrition could make workers small or less strong. Could that matter?
- Clark's response: small is fine and firms could feed workers.
- Lack of correlation between immigrants' wages in America and efficiency in their home country. What does this imply?

TABLE 8
EARNINGS OF U.S. MALE IMMIGRANTS IN MANUFACTURING, 1910

Country of Origin	Efficiency of Textile Workers (home country)	Average U.S. Wage (England = 100)	Average Age	Age–Adjusted Wage (England = 100)
Canada	124	78	39.0	75
England	100	100	38.7	100
Germany	63	96	40.9	90
France	54	93	36.1	98
Switzerland	69	99		
Austro-Hungary	61	85	31.6	93
Spain	45	106	31.4	115
Mexico	56	90	32.7	102
Russia	54	80	30.7	95
Italy	43	80	29.6	98
Portugal	43	57	26.4	79
Greece	23	60	26.5	83
Japan	26	75	29.5	93

From: Clark, "Why Isn't the Whole World Developed?"

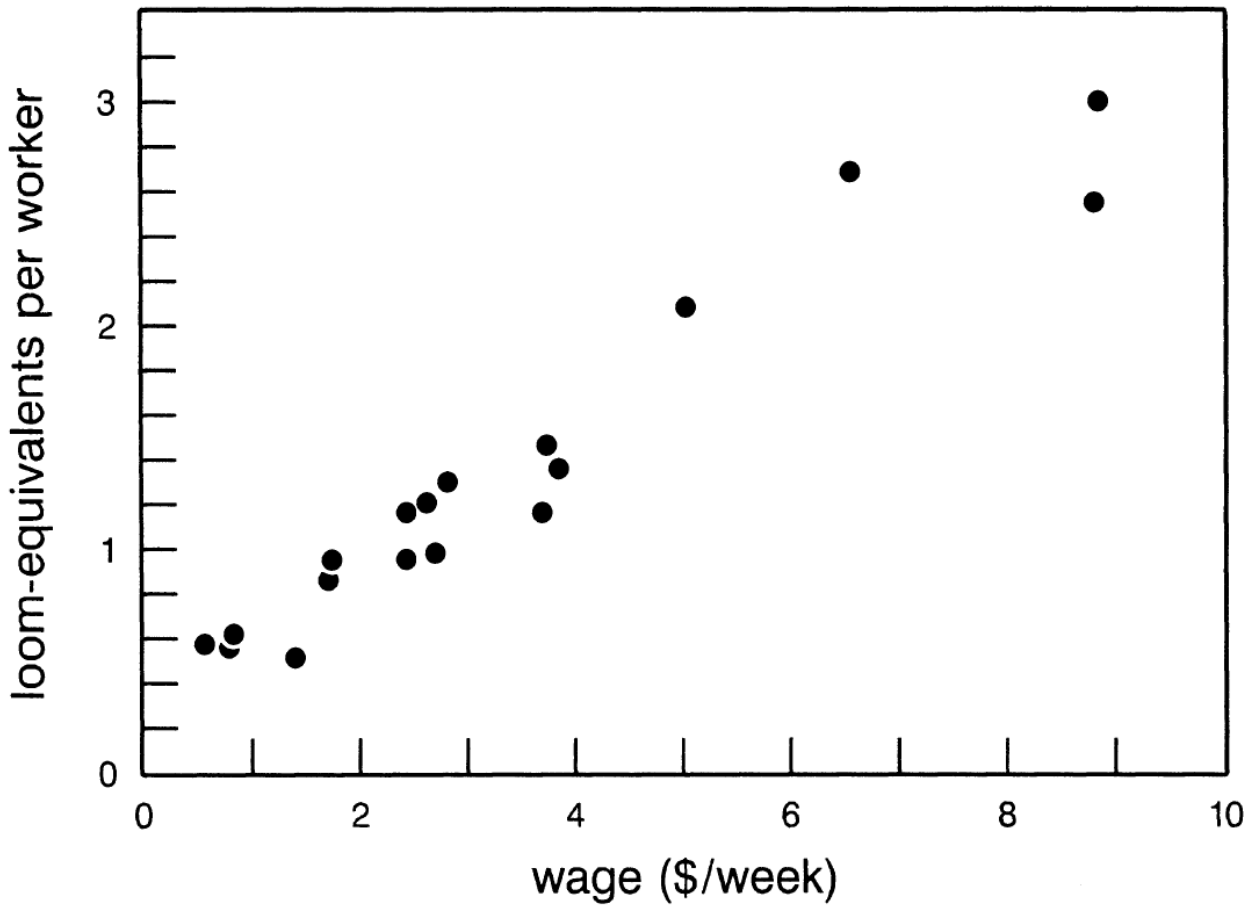
Clark's Preferred Explanation: Local Effects (Culture)

- Workers refused to tend more machines in some countries even though they could.

- Cited lack of jobs for others:

> The operatives in this mill refuse to attend to more machinery. I watched two ring frames for three minutes; there was not a single end down, yet the workpeople would not look after more than one side. They said that they are satisfied with the present wage, and that there are so many men who want work and cannot get it that it would be unfair if they were to attend to more machines.[68]

FIGURE 1
LOOM-EQUIVALENTS PER WORKER IN THE COTTON INDUSTRY, 1910



From: Clark, "Why Isn't the Whole World Developed?"

Do you agree with Clark's conclusion?

- Argument by elimination may be problematic.
    - Even if no one factor explains observed differences in staffing levels, perhaps together they may explain a lot.
- Does it make sense that culture didn't stay with workers when they moved?

Possible Implications If Clark Is Right

- Major source of underdevelopment may have been inefficiency of labor rather than inability to absorb modern technology.
- Importance of local culture could explain why people moved, rather than why capital moved.
- Wages may not be the best guide to labor costs.
- Growth may reflect labor intensification as much as technological progress.