ECO 102: Topics in Economics
Ecole Polytechnique, Spring 2022
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TD6: Quiz 1 with Econometrics and Development Economics

THE LONG-TERM EFFECTS OF AFRICA'S SLAVE TRADES NATHAN NUNN (2008)

Today, we will follow Nunn (2008). Africa's economic performance in the second half of the 20th century has lagged behind other regions. One explanation for the poor performance of African countries is the history of exploitation and extraction suffered by these countries. In a prominent research paper, one economist attempted to estimate the causal effect of historical slave extraction on GDP per capita in the year 2000 in African countries.

Exercise

1. Why would slave extraction between the years 1400 - 1800 have any effect on GDP per capita in the year 2000? (5 points)
   Correction: Loss of labor force impeded investment in infrastructure, which lead to lower GDP and GDP per capita in 2000. Not obviously the case. Perhaps African countries caught up quickly (conditional convergence)
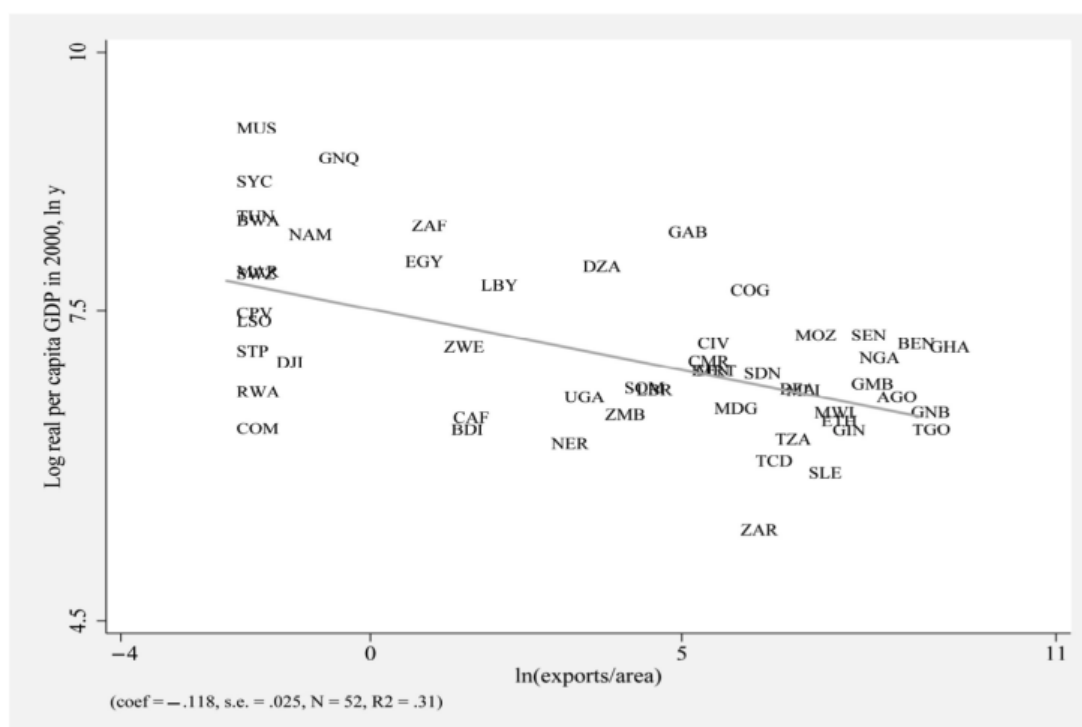

Figure 1: Relationship between Log Slave Exports Normalized by Land Area, $ln(exports/area)$, and Log Real Per Capita GDP in 2000, lny

2. In Figure1, the researcher plots the natural log of real GDP per capita in the year 2000 on the y-axis against the natural log of slave exports per land area ("$ln(exports/area)$"

) on the x-axis. Each three-letter symbol indicates the position in x-y space of a single country, with the letters indicating the name of the country. For example, "SEN" indicates the country Senegal. The correlation appears to be negative. Under what conditions could we conclude from this graphical analysis that the slave trade contributed to economic stagnation in African countries? (5 points)
Correction: slave exports are uncorrelated with any other determinants of real GDP per capita in the year 2000. In particular, no measurement error in slave exports.

3. To address potential endogeneity of the slave export variable, the author includes linear controls for geography and colonial links and estimates the regression

$$lny_i = \beta_0 + \beta_1 * ln(exports/area)_i + X_i\gamma + \epsilon_i$$

where lny_i is the natural log of real GDP per capita in country i in the year 2000 and X_i is the vector of controls. Results are reported in Figure 3. Point estimates are reported next to the variable names and standard errors are reported below each point estimate in brackets. Each column (1 - 6) indicates a different regression with a different set of controls. In each case, the dependent variable is ln real GDP per capita in the year 2000.

1. In column 1, the point estimate implies that a 1 unit increase in $ln(exports/area)_i$ translates into a decrease of how much in lny_i ? (5 points)
Correction: 0.112

2. In column 1, the point estimate implies that a 10% increase in $(exports/area)_i$ translates into what percent decrease in y_i? (5 points)
Correction: 1.12%

3. Even in column 6, where the author controls for many variables, the relationship between $ln(exports/area)_i$ and lny_i is still statistically significant. Can we interpret these results as causal? Or could omitted variables still explain the correlation? If so, indicate precisely what variable or variables you think are omitted from the regression.(10 points)
Correction: Initial wealth probably correlates negatively with slave extraction (maybe positively?), and initial wealth correlates with wealth in 2000. Also measurement error.

4. To address lingering endogeneity concerns, the author proposes to instrument $ln(exports/area)_i$ with distance measures from each country to the main destinations of slave ships. The idea is that the closer a country is to the (foreign) labor demand, the more attractive the country is as a source of slaves, and so the larger the slave extraction. In fact, these distance measures correlate with $ln(exports/area)_i$, and so the author implements the instrumental variables estimation and reports results in Figure. Each column represents a different regression, with different sets of controls. In each case, the dependent variable is ln real GDP per capita in the year 2000. In each case, $ln(exports/area)_i$ is instrumented with distance metrics. The instrumental variables point estimates are reported with standard errors below in curved brackets (don't worry about the square brackets)

1. Why might the IV estimates in Figure 3 be larger in magnitude than the OLS estimates in Figure 2? (5 points)
Correction: Measurement error biases OLS towards zero. Also, if initial wealth correlates negatively with slave extraction, then OLS will be biased UP. Hence, OLS (-.112) is more

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)
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

Notes. OLS estimates of (1) are reported. The dependent variable is the natural log of real per capita GDP in 2000, ln y. The slave export variable ln(exports/area) is the natural log of the total number of slaves exported from each country between 1400 and 1900 in the four slave trades normalized by land area. The colonizer fixed effects are indicator variables for the identity of the colonizer at the time of independence. Coefficients are reported with standard errors in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Figure 2: ESTIMATED TOTAL SLAVE EXPORTS BETWEEN 1400 AND 1900 BY COUNTRY

positive then IV (-.208)

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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

Figure 3: ESTIMATES OF THE RELATIONSHIP BETWEEN SLAVE EXPORTS AND IN-COME

2. Do you think the distance metrics represent a valid instrument in this case? If yes, state the identification assumption in natural language. If not, explain how these distance metrics might correlate with the error term. (5 points)
Correction: Distance to labor markets could have independent influence on GDP per capita in 2000. But Nunn checks this with a "placebo" test. For Non-african countries, distance to slave-demanding regions does not correlate with GDP per capita in 2000. Hence, there is no general effect of distance to these regions.

Bibliography

Nunn, N. (2008). The long-term effects of africa's slave trades. *The Quarterly Journal of Economics*, 123(1):139–176.