Development Economics

Slides 10

Debraj Ray, NYU

Two Studies of Institutions

Acemoglu, D., Johnson, S. and J. Robinson (2001), "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* **91**, 1369–1401.

Alesina, A. Giuliano, P. and N. Nunn (2013), "On the Origins of Gender Roles: Women and the Plough," *Quarterly Journal of Economics* **128**, 469-530..

For other papers, see syllabus.

Colonial Origins of Comparative Development

- **AJR measure of institutions: "protection against expropriation."**
- *Political Risk Services* publishes this data.
- One could argue that this is a very narrow measure, but anyway …

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- **The regression they're interested in:**

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

where:

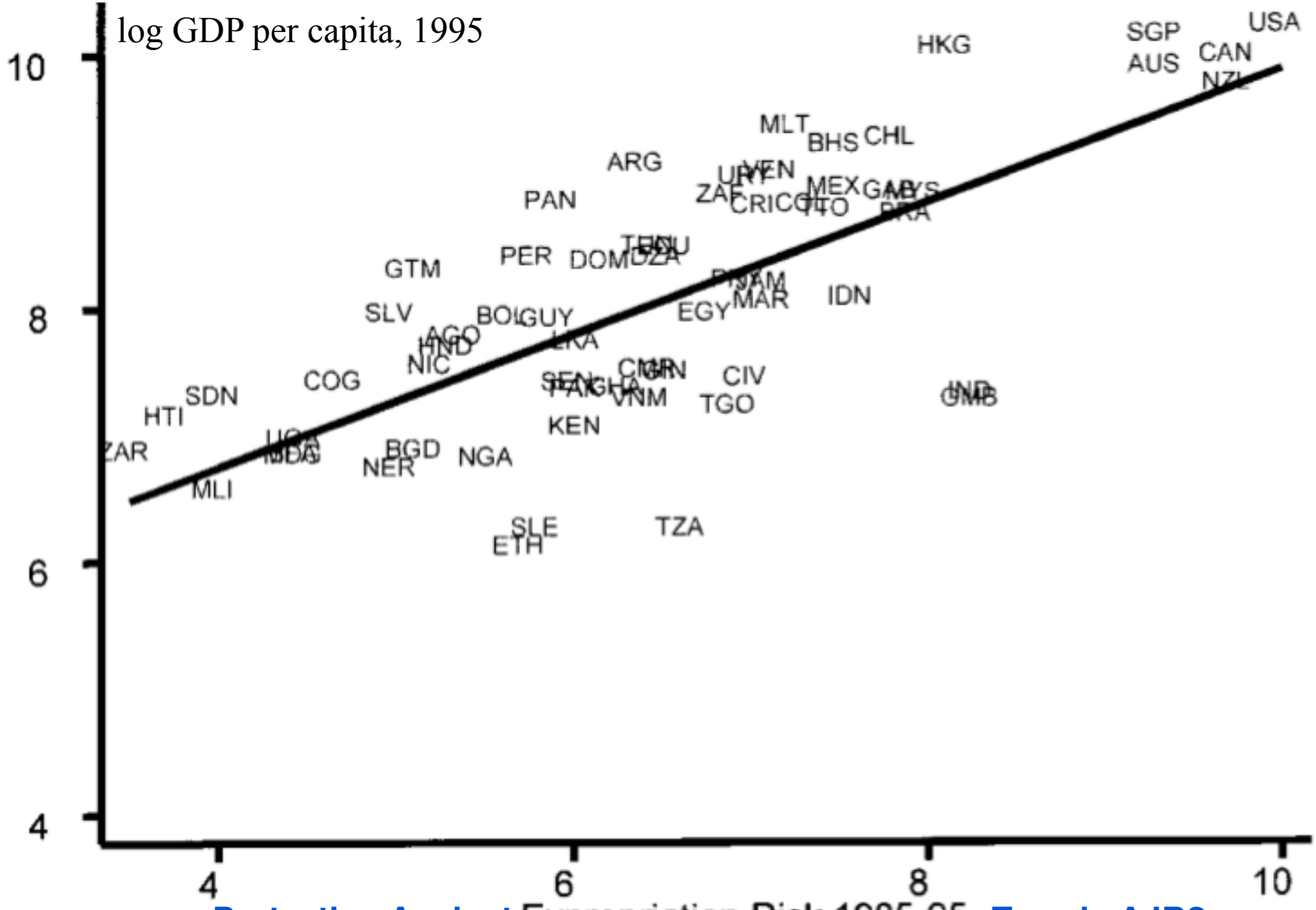
- y_i is log per-capita GDP
- R_i is "protection against expropriation"
- X is a vector of country characteristics (latitude, regional membership).

OLS Regression from AJR

	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.

Accompanying Diagram to OLS Regression



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- Omitted Variables:
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- Measurement Error
  - Protection measured with noise, especially in developing countries

Endogeneity

Endogeneity

- **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?**

- Two countries with different expropriation risk: Nigeria and Chile.

- The 2SLS estimate predicts a 7-times difference in per-capita income.

- Not implausible: Chile around 11 times as rich at time of study

- **What sort of magnitude are we talking about?**

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- **Is the instrument believable?**

- Main threat to exclusion restriction 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 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.

Long Shadows: The Plough

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

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“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.”

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- **Obvious strategy: regress gender norms today on earlier use of plough.**
  - We have pre-historical data on plough use, and
  - Modern surveys of gender roles and female participation in labor force.

Data

- **Pre-industrial plough use:**

- George Murdock's *Ethnographic Atlas*, data on 1265 ethnic groups.
- Contains data on plough use for 1156 ethnicities, mainly before 1950.
- 997: no plough, 141: aboriginal plough, 18: after European contact.

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- **Various controls:**
- Historical: domesticated animals, population density, jurisdictional hierarchies, group location
- Contemporary: per-capita GDP

Data

- **Matching present to past:**

- *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.

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  - 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

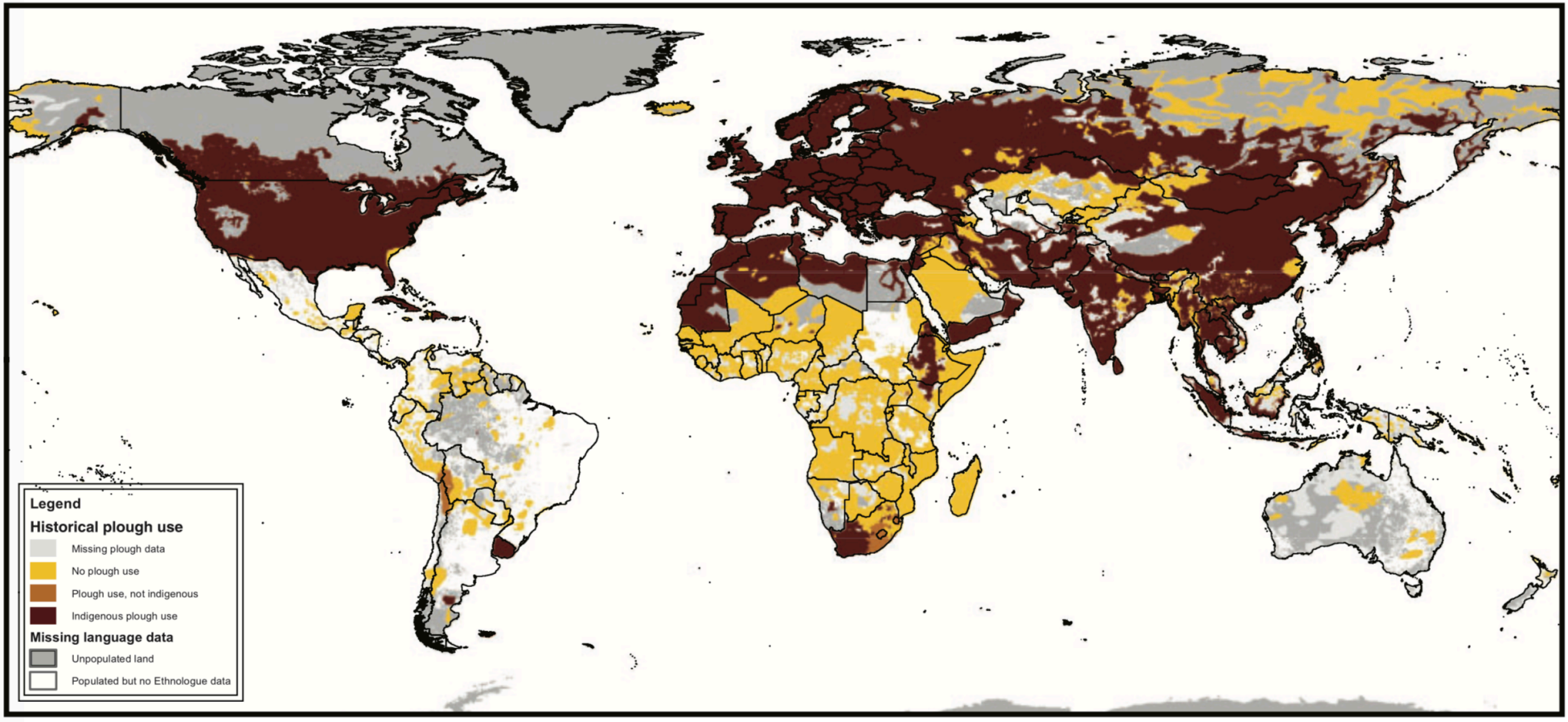

FIGURE II

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).

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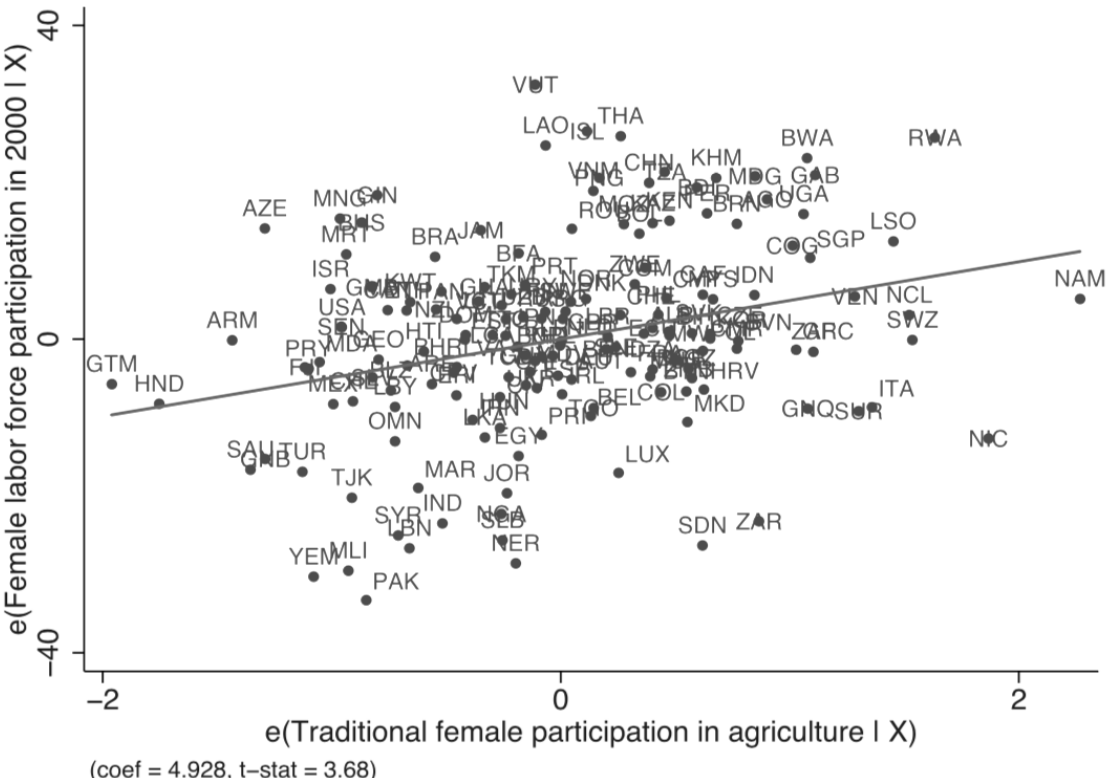

Plough-Positive and Plough-Negative Crops

Pryor *Comparative Studies in Society and History* 1985

- Plough-positive: teff, wheat, barley, rye, wet rice.
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- Specifically, assess suitability for the plough-⊕ cereals wheat, barley, and rye, and for the plough-⊖ 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);

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- **IV coefficients even larger than OLS:**

- Endogeneity of plough adoption by historically advanced societies.

- Could have better gender norms today, biasing OLS estimates downward.

Pathways

- **Pathways**: attitudes or institutions?

- Attitudes = beliefs, cultural norms about role of women

- Institutions = legal systems and policies that inhibit female participation.

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- 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.)

DETERMINANTS OF FEMALE LABOR FORCE PARTICIPATION FOR US CHILDREN OF IMMIGRANTS

	(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

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- **Two Studies of Long Shadows:**
- Origins of property rights
- Early technologies
- **General strategy: Use of instrumental variables**
- Comment: the identification-creativity frontier.