Economics 210A
Spring 2015

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LECTURE 2
Population Growth and Standards of Living

January 28, 2015

I. Overview

Fundamental Question

- Huge improvement in standard of living from subsistence in roughly 1200 to plenty (in places) by 1850.
- What caused it?
- Much debate about timing (Clark).

Sources of Early Growth

- Changes in population dynamics (Voigtländer and Voth)
- Cultural factors (Alesina, Giuliano, and Nunn)
- Institutions (DeLong and Shleifer)
- Technological change (Dittmar)
- Change in labor quality or effort (DeVries)

Methods and Approaches

- Detailed data collection.
- Model.
- Regressions and concern about omitted variables.
- Broad arguments and anecdotes.

II. Gregory Clark:

"The Condition of the Working Class in England, 1209-2004"

A. Measurement Issues

- Whose wages?
- How does Clark measure nominal wages?
- How does he measure prices?
- Comparison to other measures and evaluation.

Whose wages?

- Builders
- Why?
- Is this sensible? Possible issues?

Measuring Nominal Wages

- Sources?
  - County records
  - Manor books
  - Institutions

Measuring Nominal Wages

- Methodology:

Wages for laborers and assistants for 1914 and before were calculated in a similar way by fitting the parameters of a regression of the form

$$\ln(W_{it}) = \alpha_i + \beta \text{JOINT}_{<1350} + \sum_{l=1}^{4}\sum_{m=1}^{13} \theta_{lm} \text{REGION}_l \text{PERIOD}_m + \sum_t \phi_t D_t + \epsilon_{ijt}. \quad \text{(A2)}$$

where D_t is a dummy variable for each year.

- What does Clark do once he runs the regression?

Measuring Prices

- Sources?
- Methodology?

The individual price series were derived as the estimated parameters on year indicators of regressions of the form

$$\ln(P_{it}) = \sum_k \beta_k \text{DTYPE}_k + \sum_t \phi_t D_t + \epsilon_{ikt},$$

where DTYPE is a dummy variable for each type of a product, with a type defined by location, purchaser, characteristics, and measuring unit.

- Weights? Uses constant expenditure weights

$$p_t = \prod_i p_{it}^{a_i}.$$

Comparison to Alternative Real Wage Series

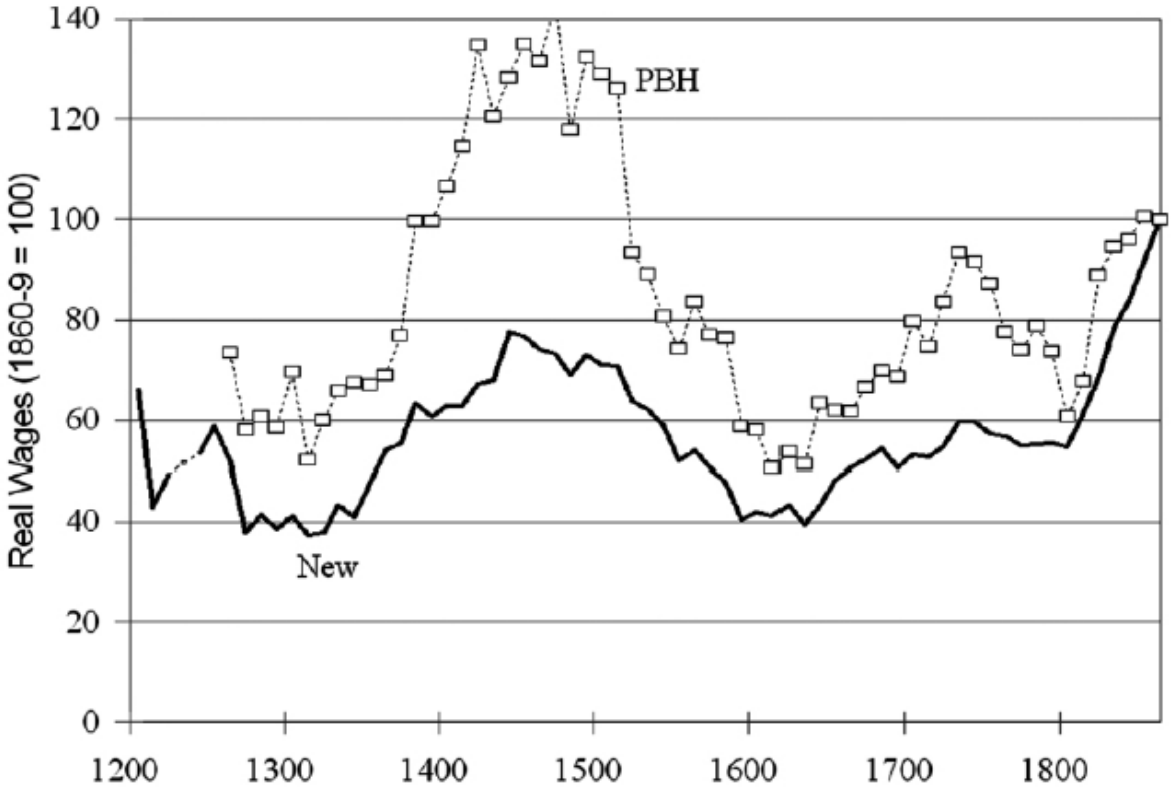


FIG. 4.—Real wages, 1200–1869, Phelps Brown and Hopkins vs. new series. In both series, 1860–69 has been set to 100. Sources: Phelps Brown and Hopkins (1981, 28–31), table A2.

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Comparison to Alternative Nominal Wage Series

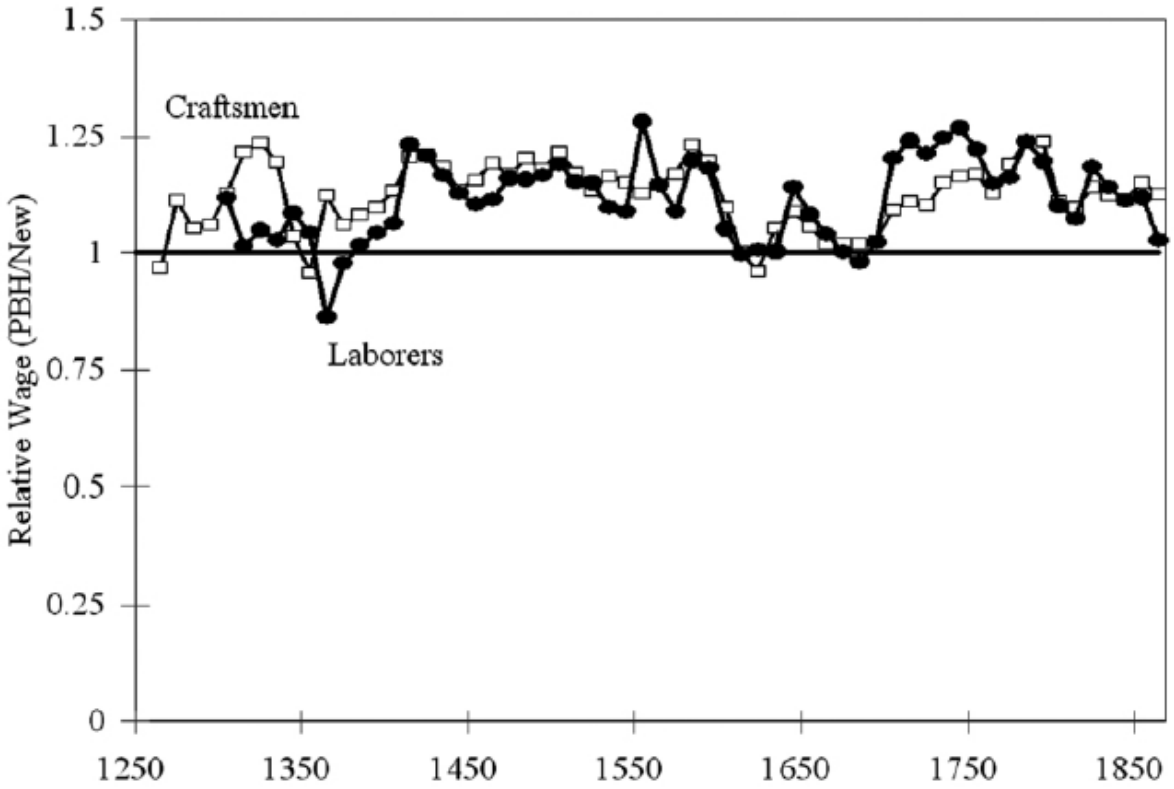


FIG. A1.—Nominal wages in Phelps Brown and Hopkins relative to this paper. Sources: table A2, Phelps Brown and Hopkins (1981, 11–12).

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Comparison to Alternative Price Series

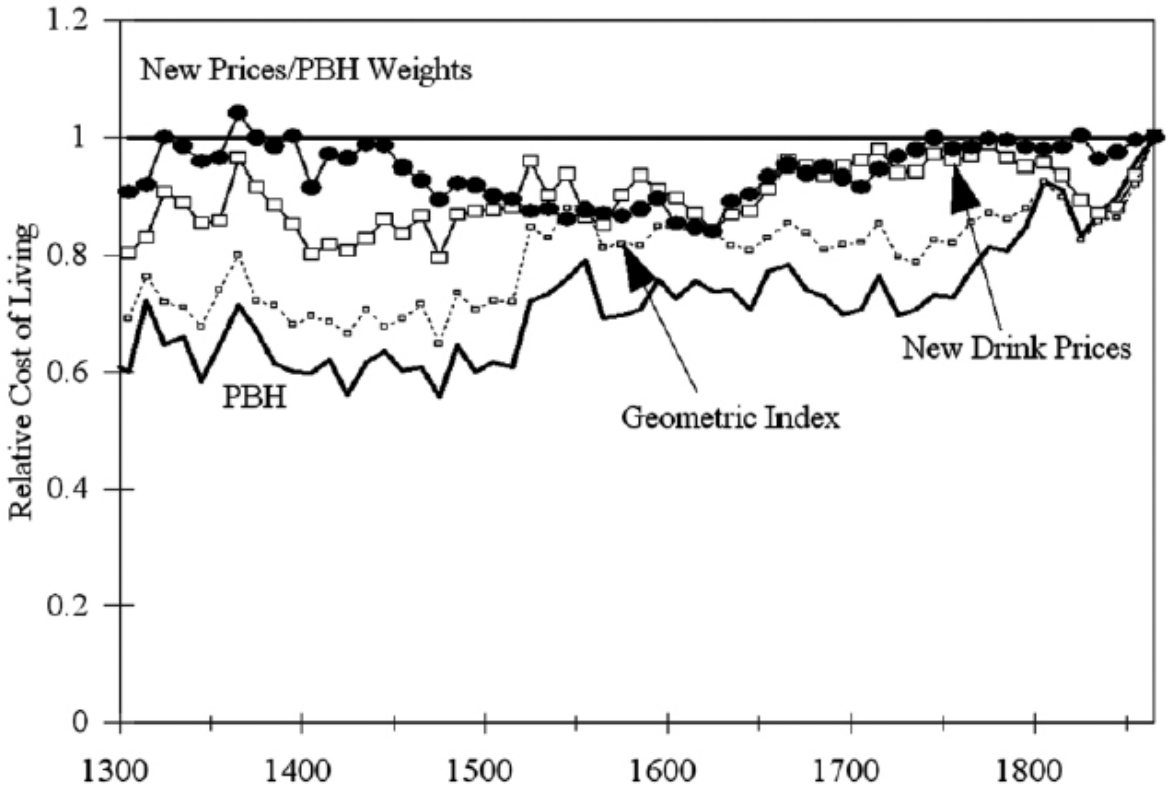


FIG. A2.—The cost of living in Phelps Brown and Hopkins relative to this paper. The ratios are the relative cost of living by 10-year periods, compared to 1860–69. Sources: tables A3 and A4; Phelps Brown and Hopkins (1981, 44–58).

From: Clark, "The Condition of the Working Class in England, 1209-2004"

B. Substantive Findings

- What happened to standards of living?
- Deducing productivity growth from wages and population; when did productivity rise?
- Implications for institutional stories of growth.
- Using skill premium to evaluate human capital stories of growth.
- Did the Industrial Revolution raise real wages?

Clark's New Real Wage Series

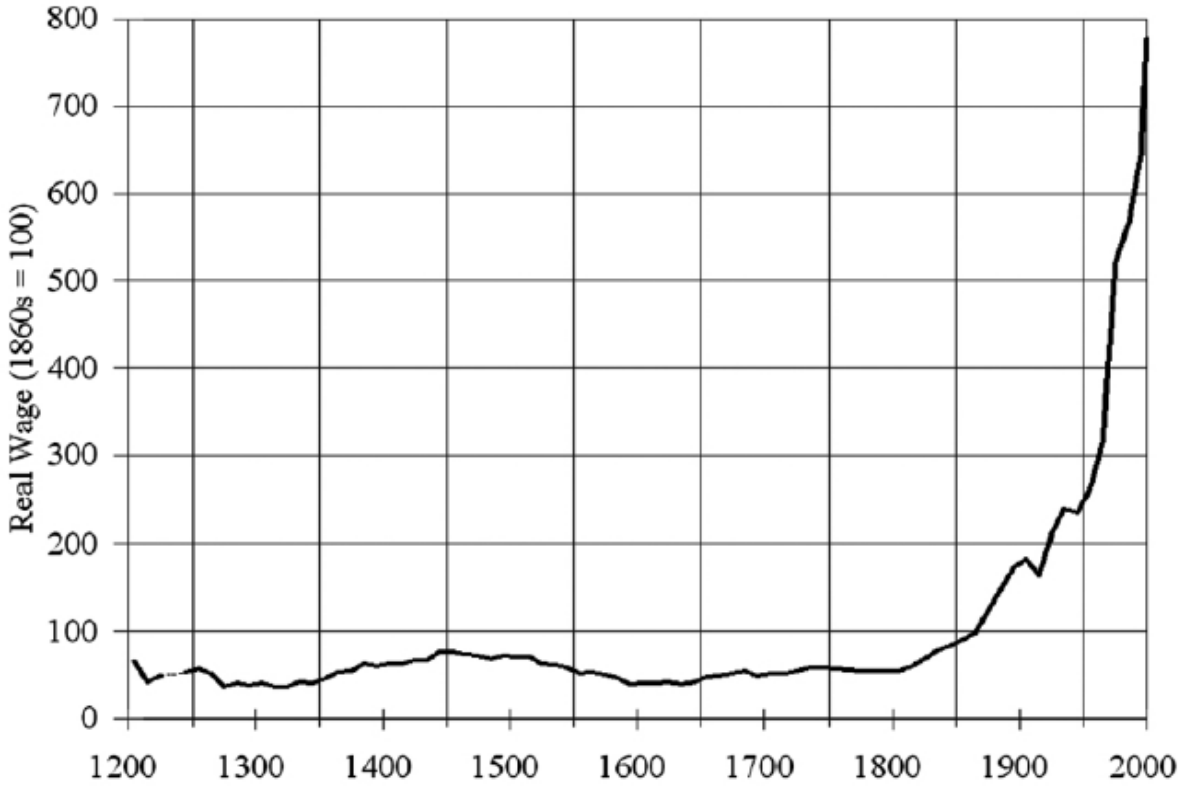


FIG. 1.—Builders' real day wages, 1209–2004 (source: table A2)

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Comparison to Alternative Real Wage Series

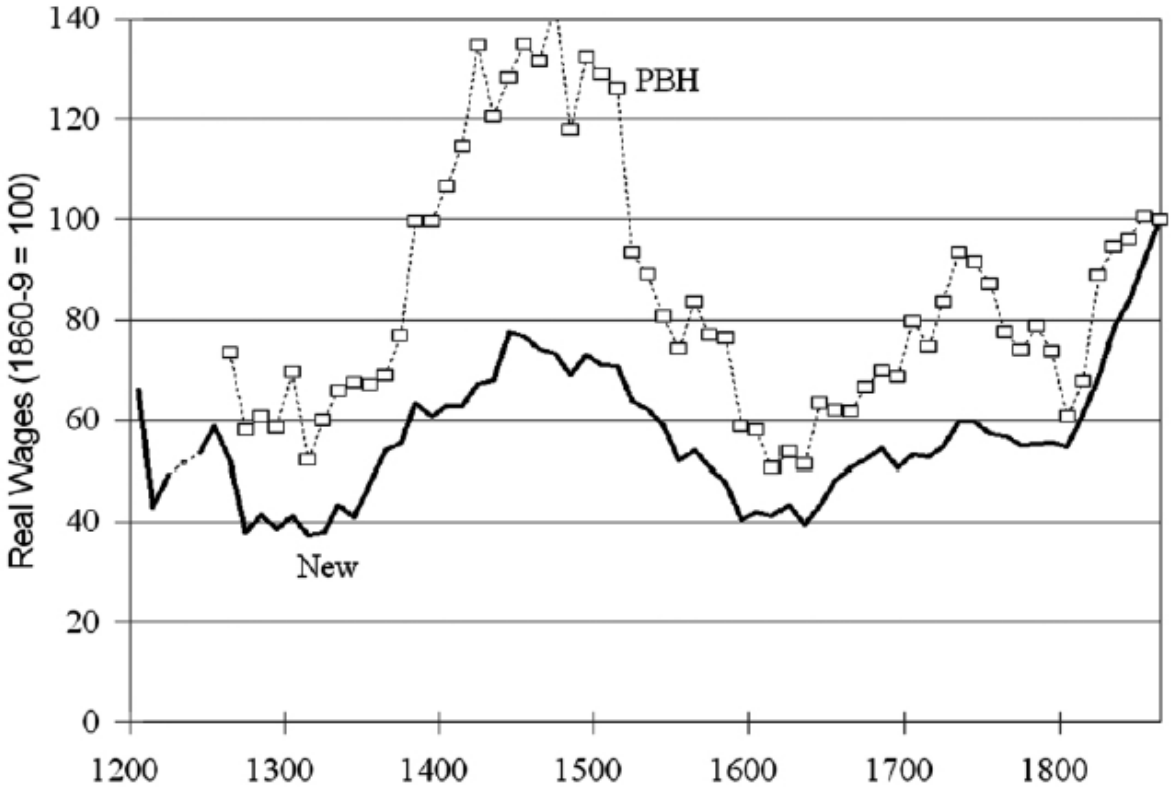


FIG. 4.—Real wages, 1200–1869, Phelps Brown and Hopkins vs. new series. In both series, 1860–69 has been set to 100. Sources: Phelps Brown and Hopkins (1981, 28–31), table A2.

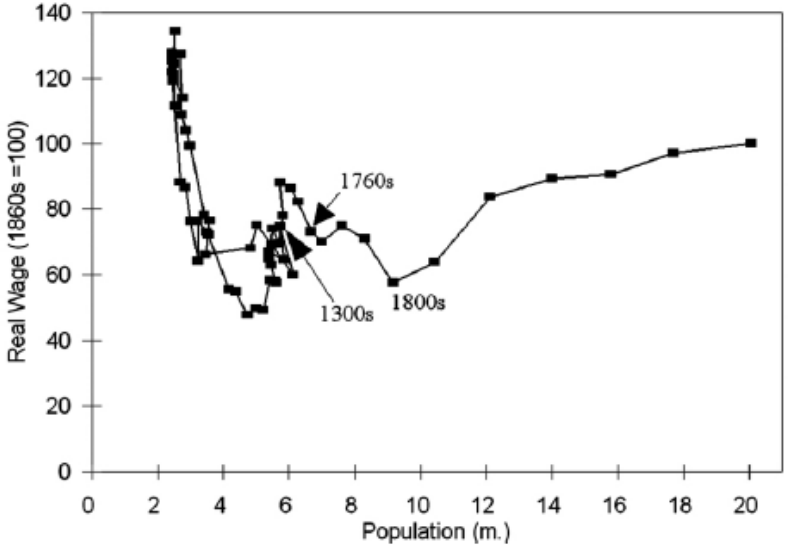
From: Clark, "The Condition of the Working Class in England, 1209-2004"

Deducing Productivity Growth from a Scatterplot of Real Wages and Population

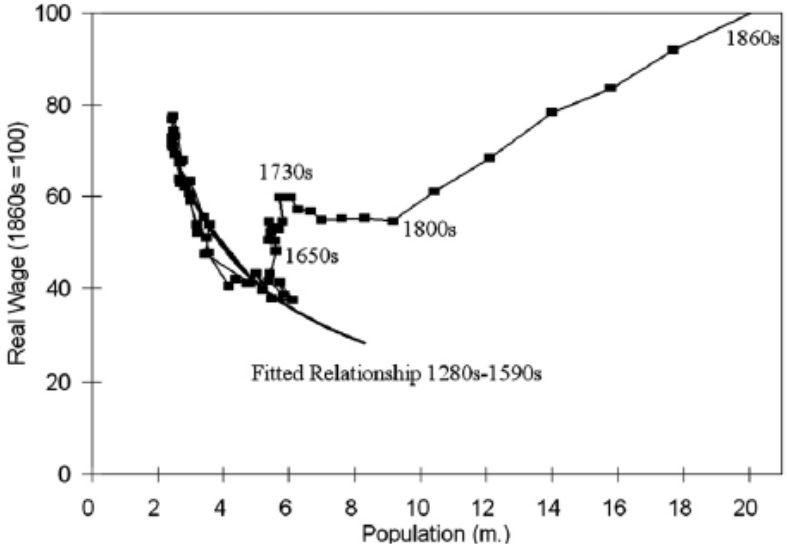
- If there is productivity growth, real wages could be stable or higher with higher population (Malthus would say stable).
- If there is no productivity growth, real wages should fall as population increases.

Real Wages and Population

Phelps Brown-Hopkins



Clark



From: Clark, "The Condition of the Working Class in England, 1209-2004"

Scatter Plot of Real Wages and Population using Clark's Data

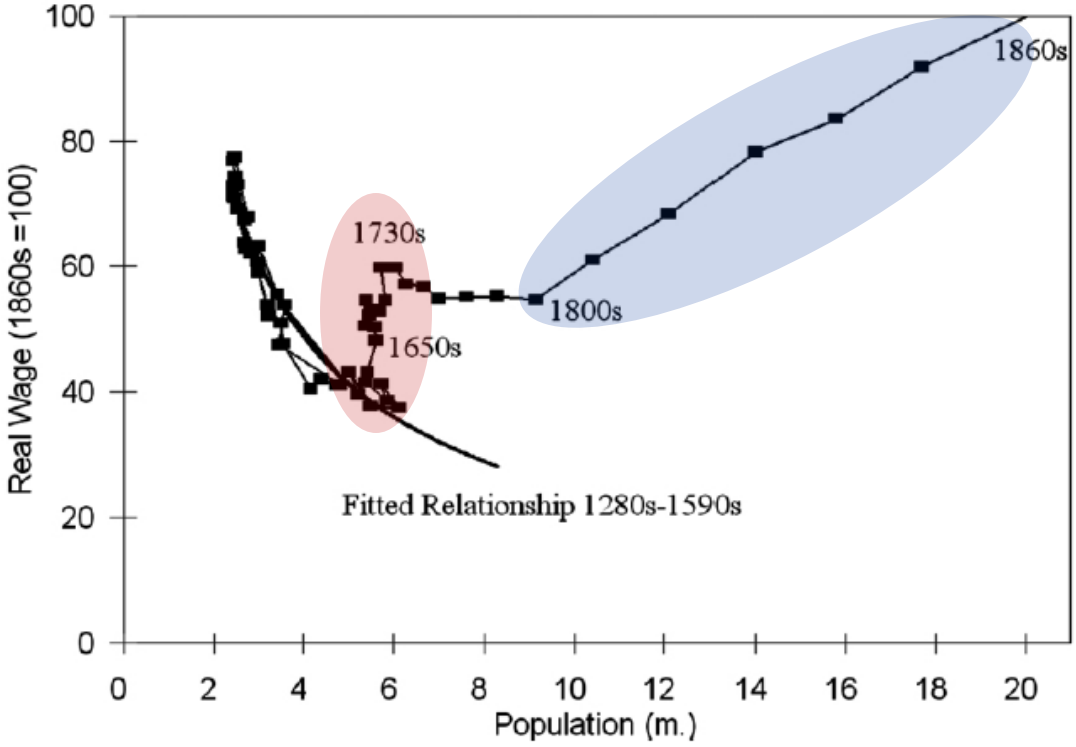


FIG. 5.—Real wages vs. population on the new series, 1280s–1860s. The line summarizing the trade-off between population and real wages for the preindustrial era is fitted using the data from 1260–69 to 1590–99. Sources: population, same as for fig. 3; real wage, table A2.

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Real Wages and Institutional Change

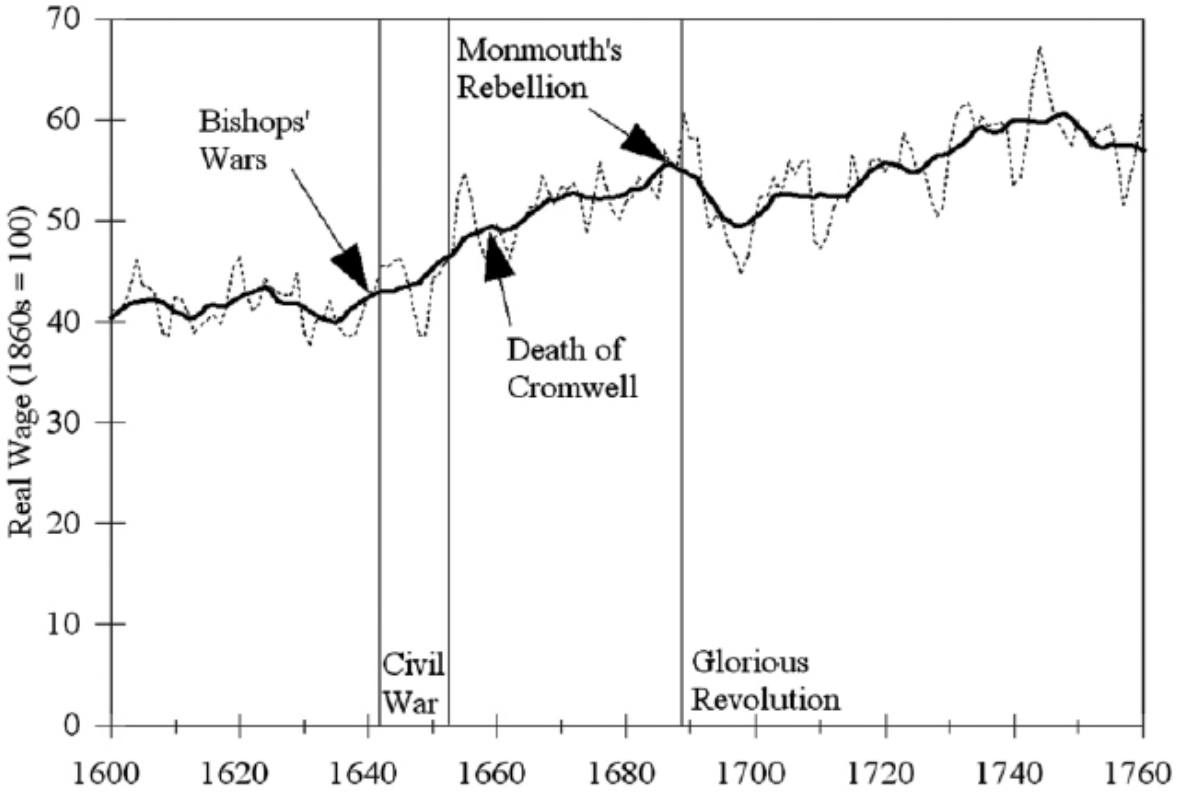


FIG. 6.—Economic growth in the seventeenth century. The dashed line shows the annual real day wage of building workers and the solid line the 11-year moving average of real day wages. Source: Appendix.

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Improvements in Literacy

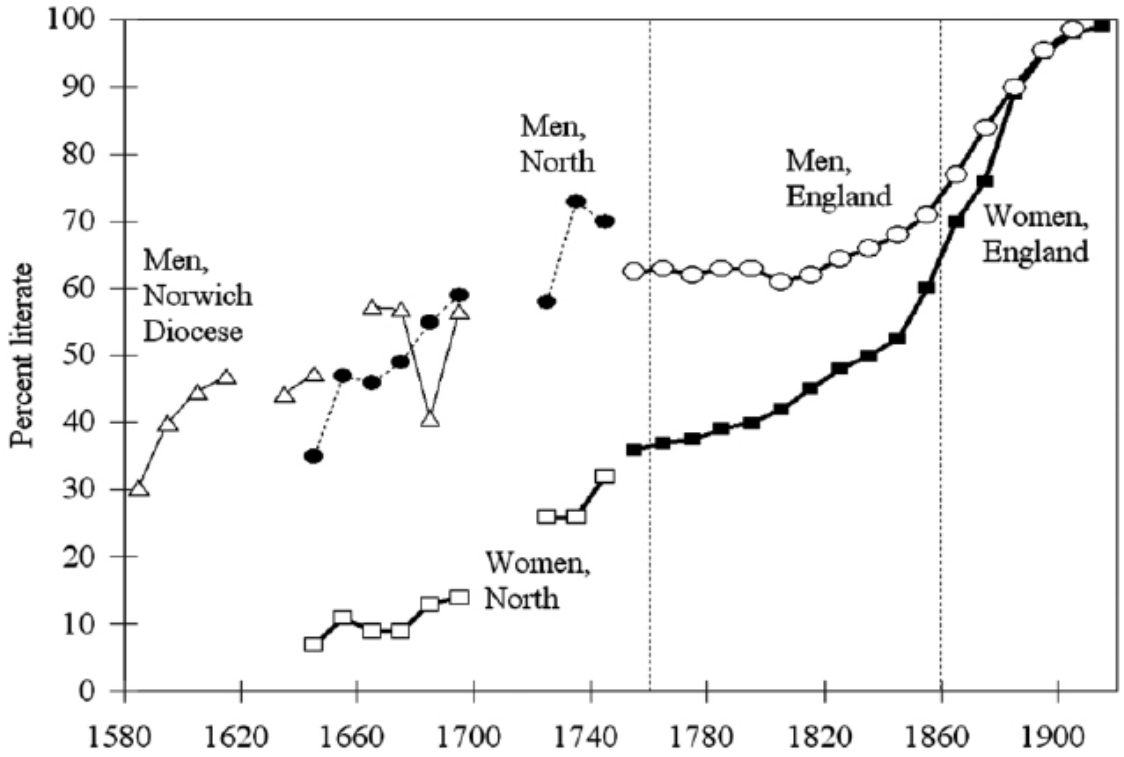


FIG. 7.—Average literacy in England, 1580–1920. Sources: 1750s–1920s, Schofield (1973), men and women who sign marriage registers; the North, 1630s–1740s, Houston (1982), witnesses who sign court depositions; Norwich Diocese, 1580s–1690s, Cressy (1977), witnesses who sign ecclesiastical court declarations.

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Skill Premium in Clark's Data

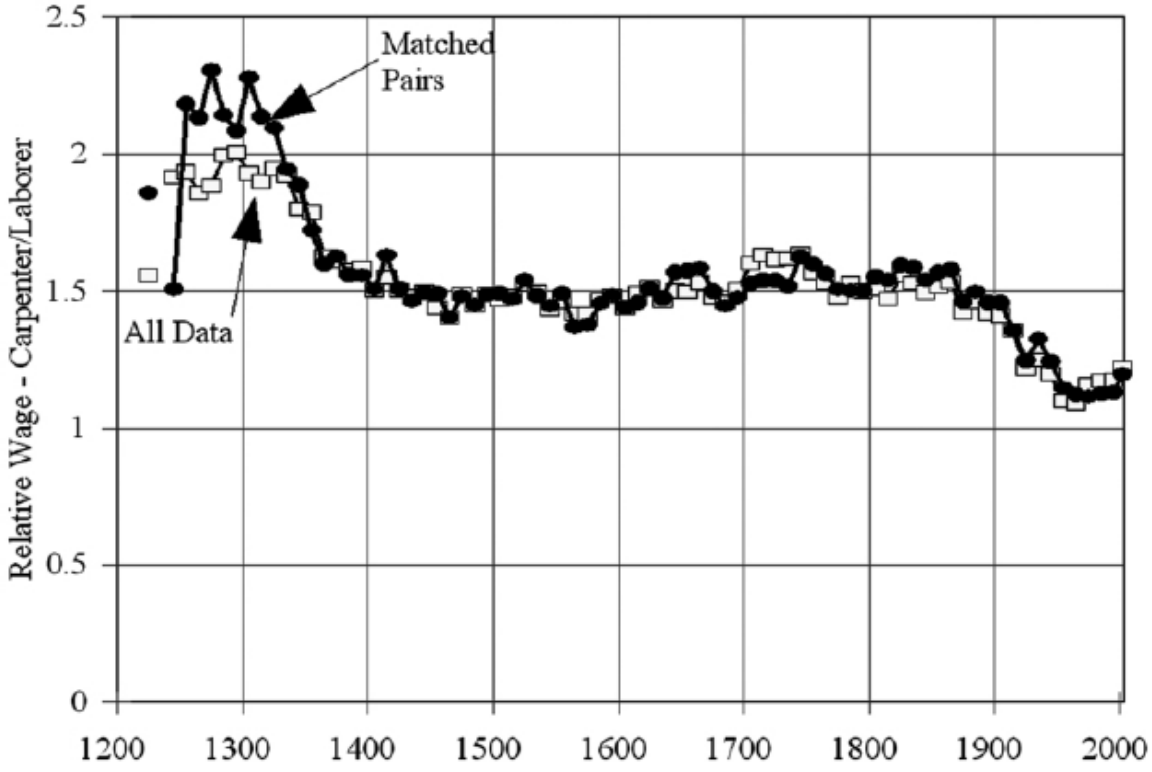


FIG. 2.—The wage of carpenters relative to laborers, 1220s–2000s (source: table A2 and Appendix).

From: Clark, "The Condition of the Working Class in England, 1209-2004"

Real Wages during the Industrial Revolution

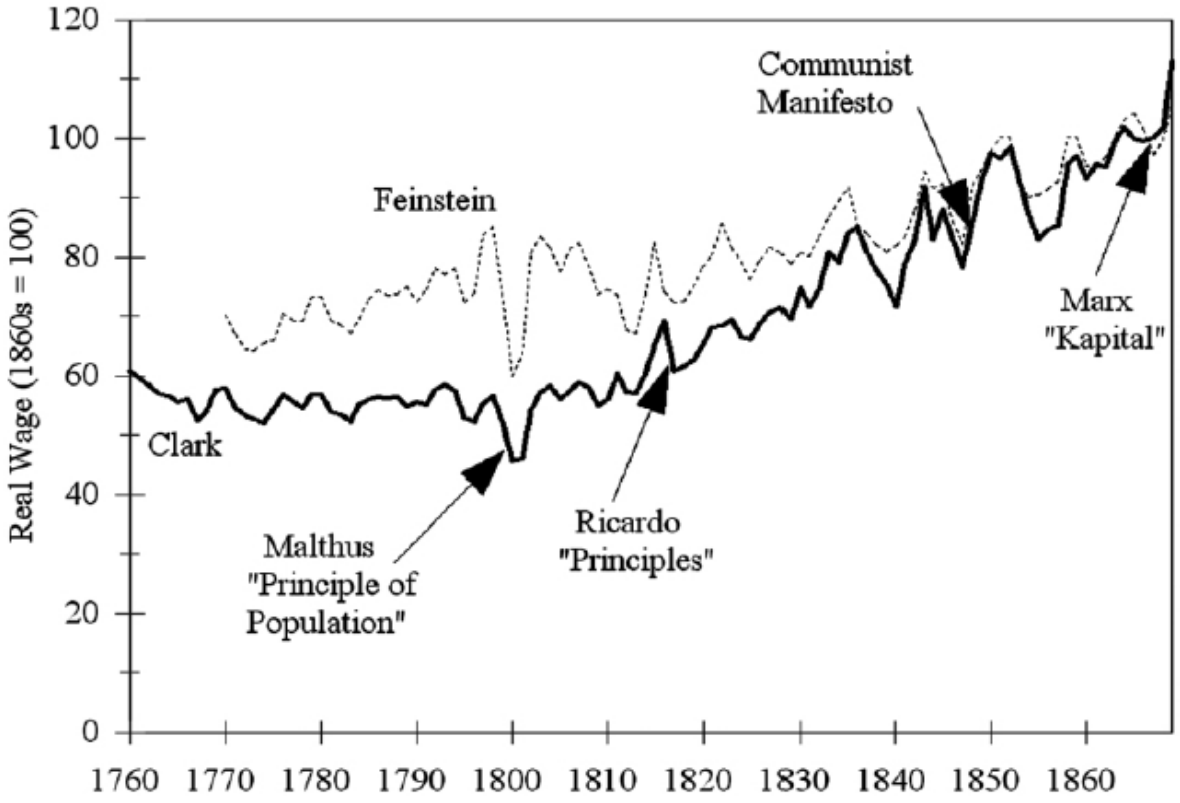
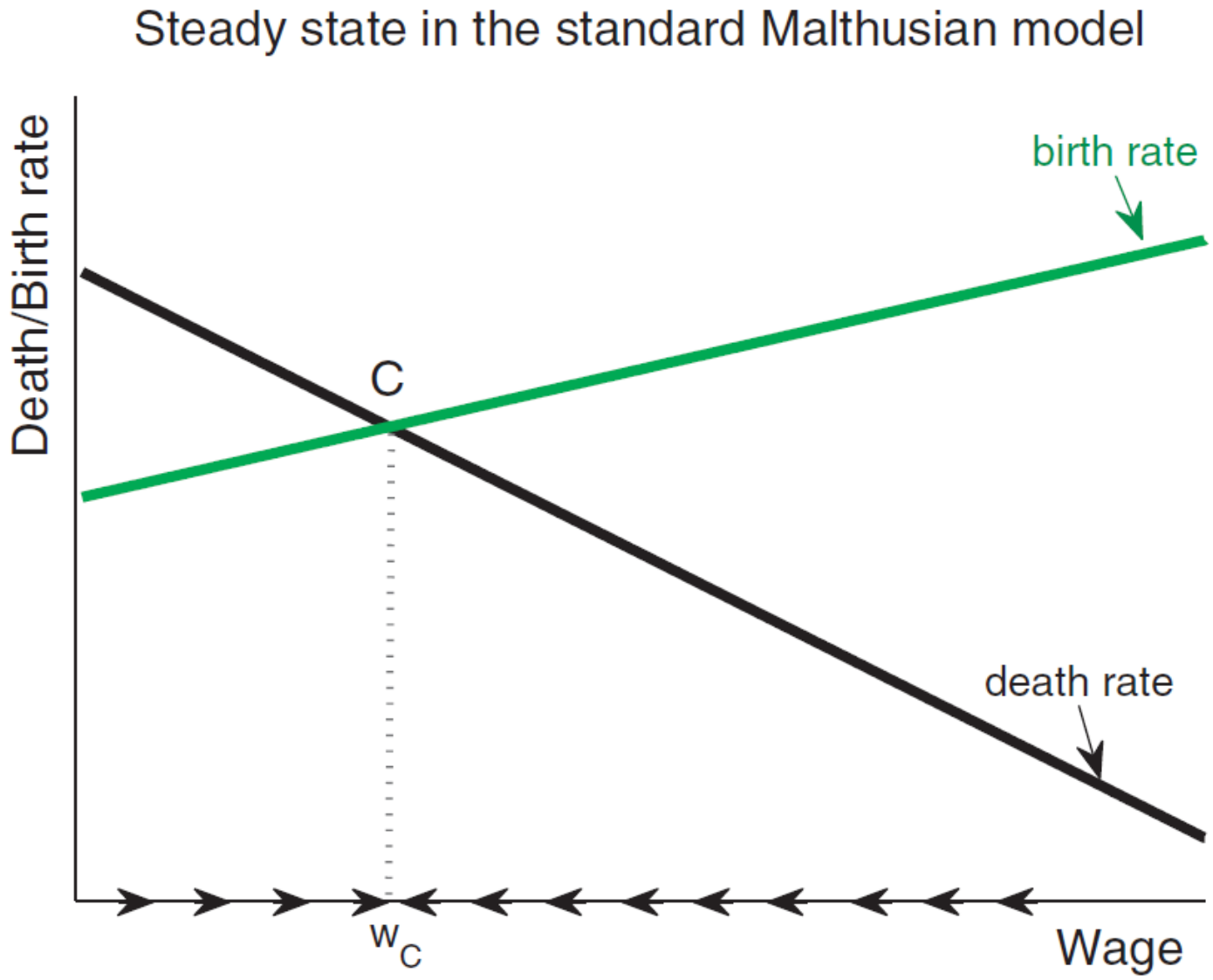


FIG. 8.—Real wages in the Industrial Revolution. Both series have been set to 100 in 1860–69. Sources: Feinstein (1998), Appendix.

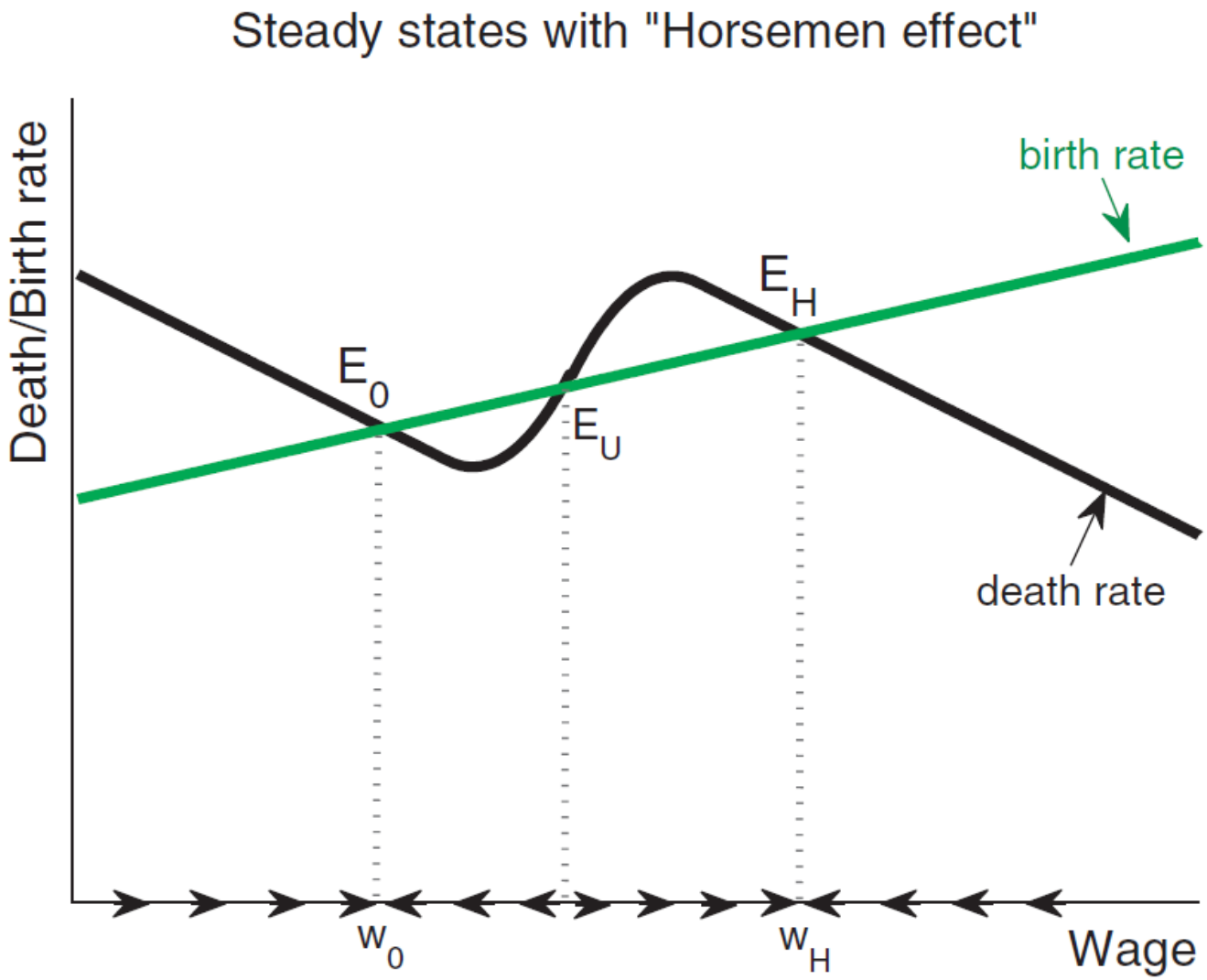
From: Clark, "The Condition of the Working Class in England, 1209-2004"

III. Nico Voigtländer and Hans-Joachim Voth:

"The Three Horsemen of Riches: Plague, War, and Urbanization in Early Modern Europe"



From Voigtländer and Voth, “The Three Horsemen of Riches”



From Voigtländer and Voth, “The Three Horsemen of Riches”

Voigtländer and Voth's Reasons for an Upward-Sloping Death Schedule over a Range

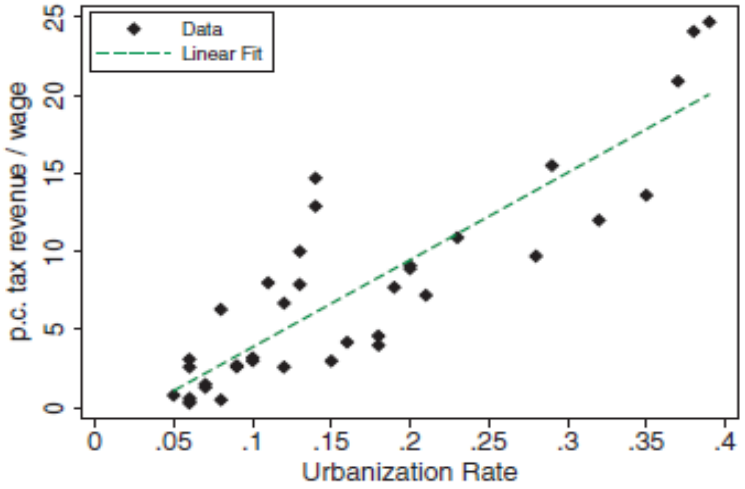
- War (mainly through disease, not deaths in battle).
- Urbanization (again, mainly through disease).
- Plague (resulting from war, urbanization, and trade).

Voigtländer and Voth's Shock Moving the Economy far from the Low-Income Equilibrium

- The Black Death of 1348–1350.

Their Evidence for Their Mechanisms: Wars

- Evidence that resources available for war are greater when incomes are higher:



- Evidence that wars spread disease and raised death rates: a series of examples.
- Evidence that wars had only small direct negative output effects: citing other scholars, institutional facts.

Their Evidence for Their Mechanisms: Cities

- Evidence that relative demand for urban-produced goods rose when incomes rose: citing both cross-section and time-series studies using data from the period, and modern studies.

- Evidence that urbanization increased mortality (in Europe in this era): data on life expectancy and infant mortality; facts about European cities (crowded, poor sanitation, proximity to animals).

Their Evidence for Their Mechanisms: Trade

- Evidence that relative demand for traded goods rose when income rose: See the evidence about urban-produced goods.

- Evidence that trade spread disease: A few facts about the first and last outbreaks of plague in Europe.

How Does Their Evidence about the Continued High Incidence of Plague Fit into Their Analysis?

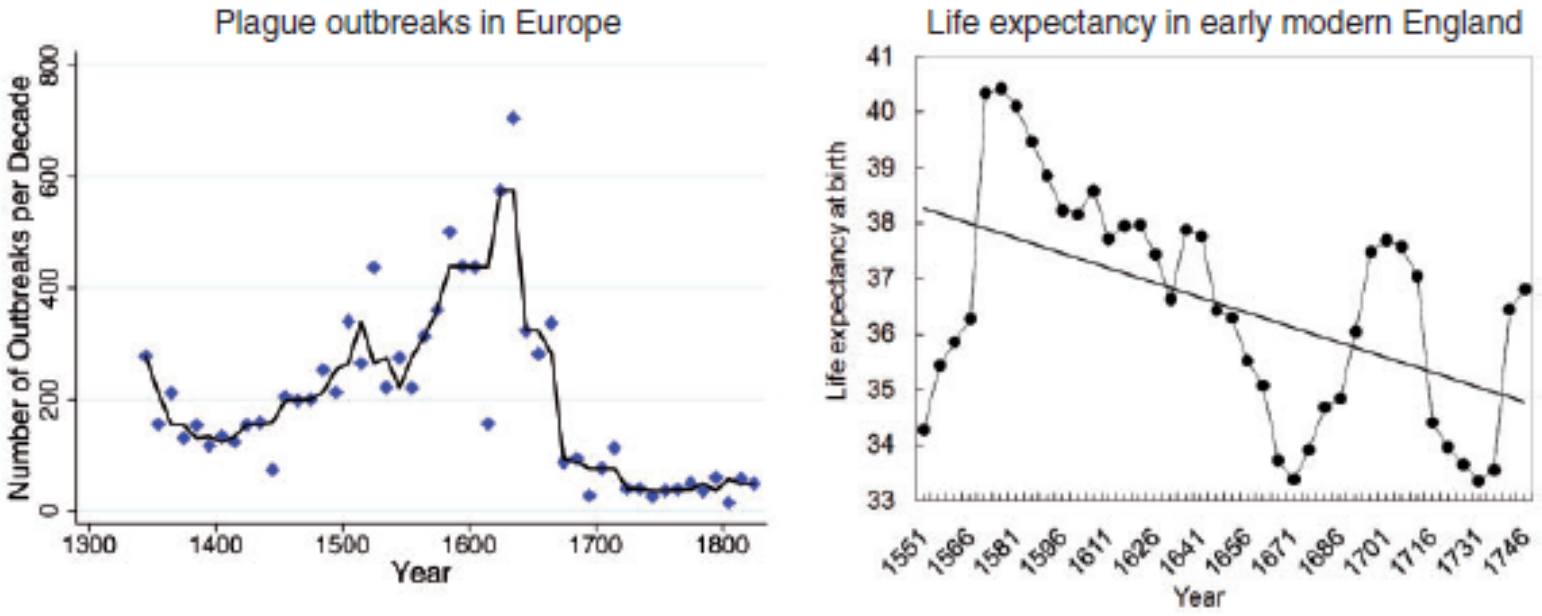


FIGURE 2

Plague outbreaks in Europe and life expectancy in early modern England. *Sources:* Left panel: Biraben (1975). Data points represent the number of outbreaks over 10-year periods. The solid line is the median of each data point and the two adjacent ones. Right panel: Wrigley and Schofield (1981); 20-year moving average

From Voigtländer and Voth, "The Three Horsemen of Riches"

A Little on Their Model and Calibration

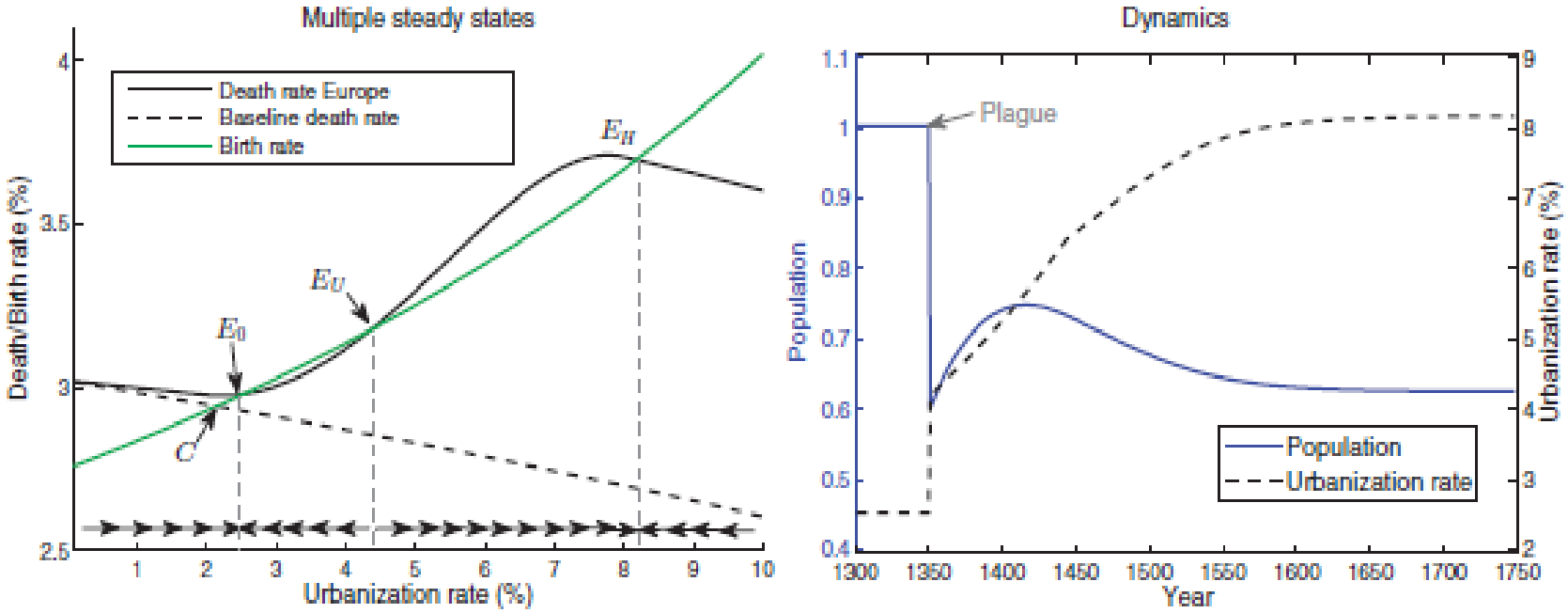
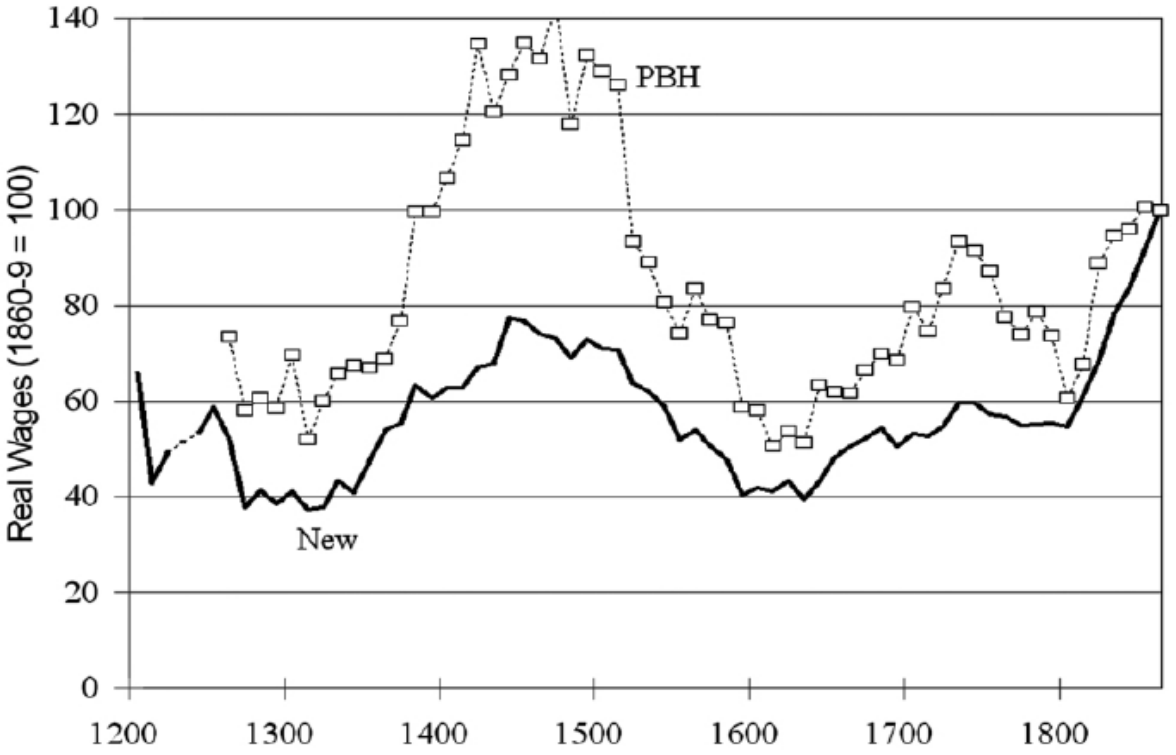


FIGURE 6

Long-run impact of the plague with "Horsemen effect"—The case of Europe

From Voigtländer and Voth, "The Three Horsemen of Riches"

Is Clark's Evidence about Real Wages Relevant to Their Analysis?



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IV. Alberto Alesina, Paola Giuliano, and Nathan Nunn:

"On the Origins of Gender Roles: Women and the Plough"

Boserup's (and Alesina, Giuliano, and Nunn's) Mechanism

- Plough use requires upper body strength (and is not conducive to having children present).
- As a result, in societies with plough agriculture, men tended to work in the fields and women at home.
- This gave rise to cultural norms in societies with plough agriculture that "the natural place for women is in the home."

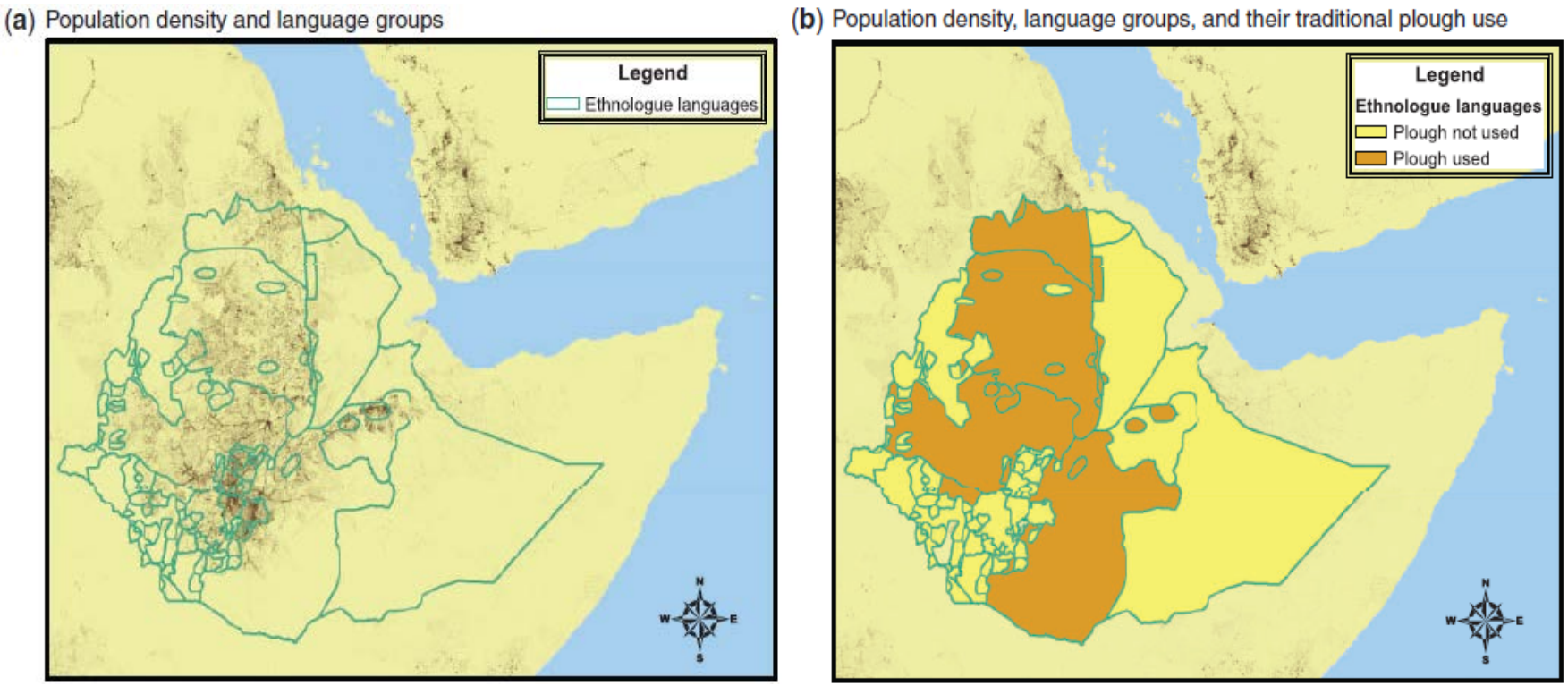

FIGURE I

Populations, Language Groups, and Historical Plough Use within Ethiopia

From Alesina, Giuliano, and Nunn, "On the Origins of Gender Roles"

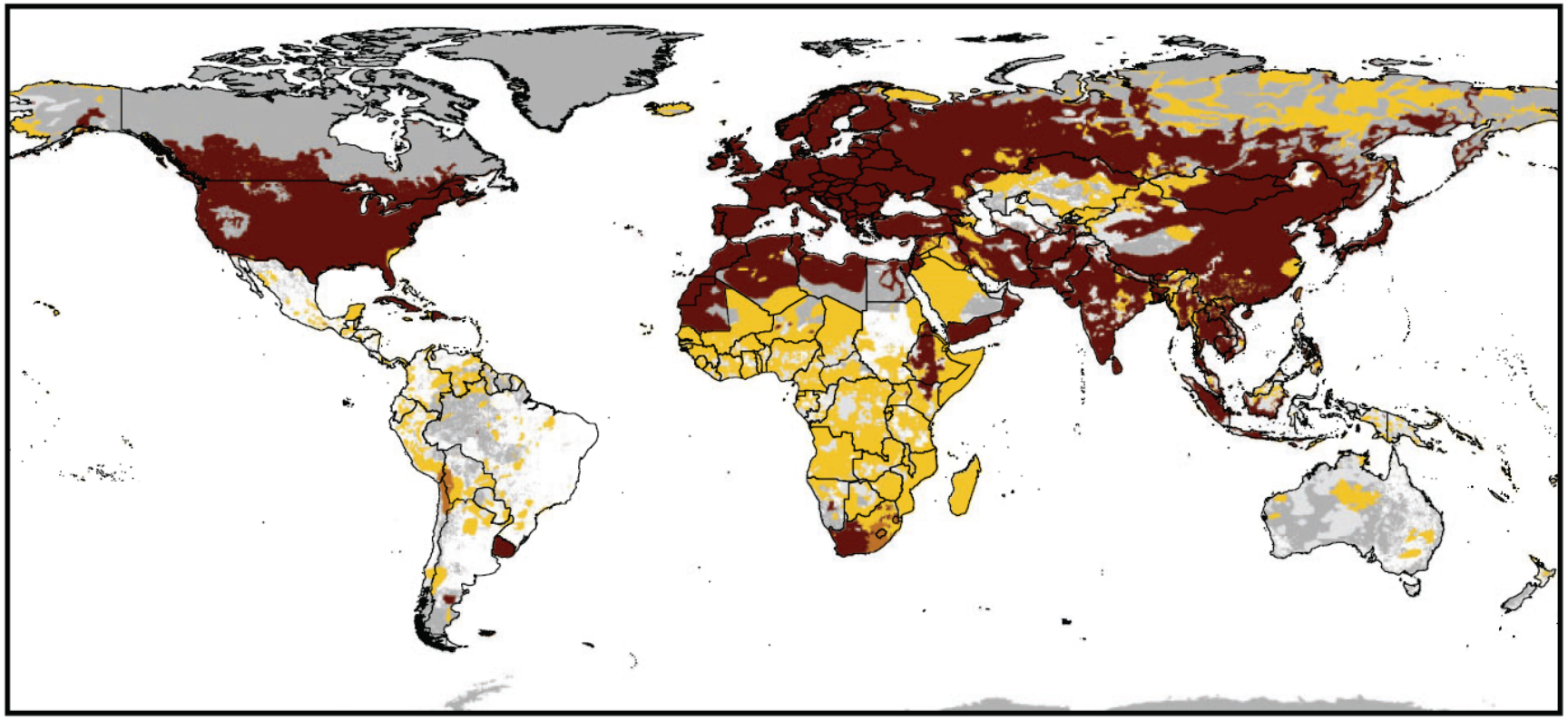

FIGURE II

Traditional Plough Use among the Ethnic/Language Groups Globally

From Alesina, Giuliano, and Nunn, "On the Origins of Gender Roles"

TABLE I

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

Notes. The unit of observation is an ethnic group. In column 1, ethnic groups are from the *Ethnographic Atlas*, and in columns 2–7, they are from the *Standard Cross-Cultural Sample*. The dependent variable measures traditional female participation in a particular agricultural activity in the pre-industrial period. The variables take on integer values between 1 and 5 and are increasing in female participation. "Traditional plough use" is an indicator variable that equals one if the plough was traditionally used in pre-industrial agriculture. For the *Ethnographic Atlas*, the mean (and standard deviation) of the traditional plough agriculture variable is 0.186 (0.390), and for the *SCCS* it is 0.234 (0.425); these correspond to the samples from columns 1 and 2, respectively. The same statistics for the other columns are slightly different. "Ethnographic controls" include: the suitability of the local environment for agriculture, the presence of large domesticated animals, the proportion of the local environment that is tropical or subtropical, an index of settlement density, and an index of political development. Finer details about variable construction are provided in the text and appendix. Coefficients are reported with robust standard errors in brackets. Column 1 reports Conley standard errors adjusted for spatial correlation. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

From Alesina, Giuliano, and Nunn, "On the Origins of Gender Roles"

Simple Scatter Plot

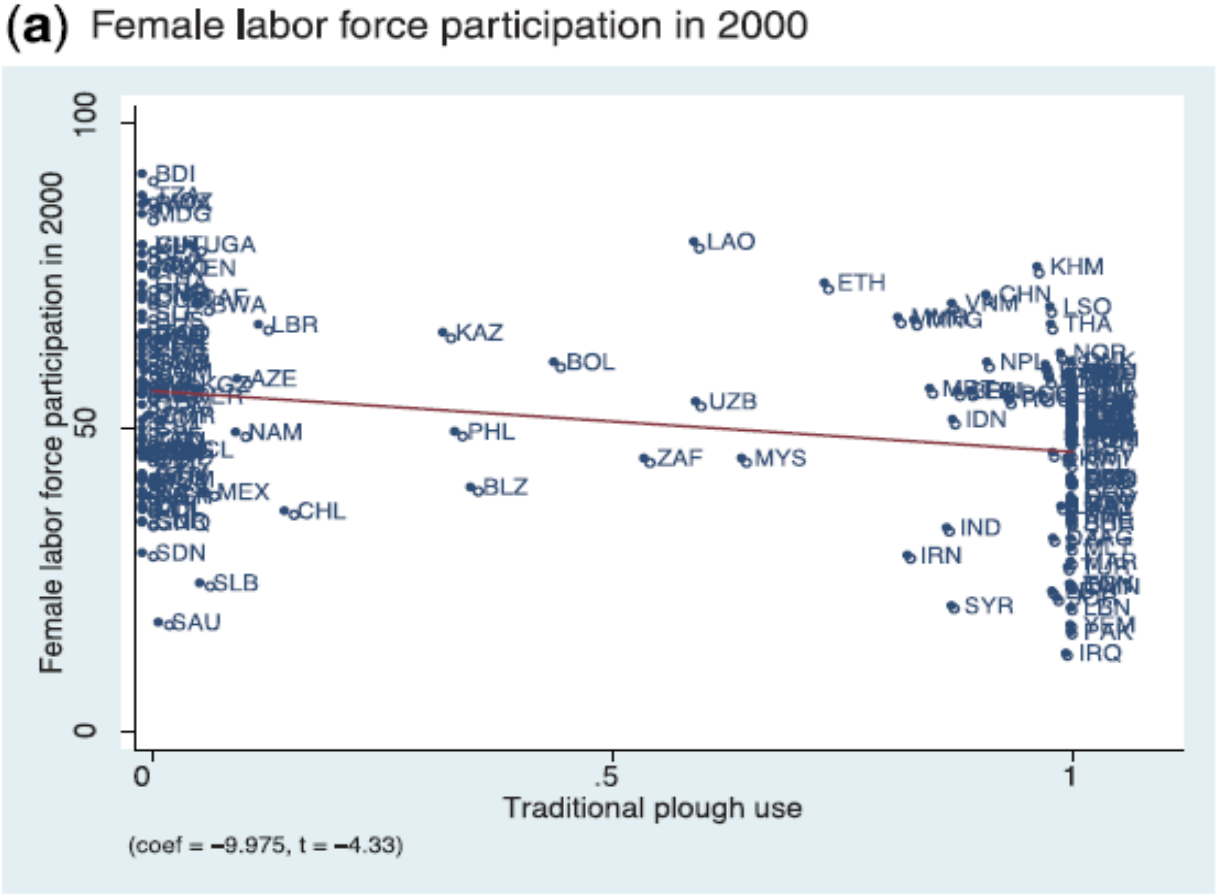

FIGURE III

Bivariate Correlations with Traditional Plough Use

From Alesina, Giuliano, and Nunn, “On the Origins of Gender Roles”

Control Variables

We test Boserup's hypothesis by estimating the following equation:

$$y_c = \alpha + \beta \text{Plough}_c + \mathbf{X}_c^{\mathbf{H}}\boldsymbol{\Gamma} + \mathbf{X}_c^{\mathbf{C}}\boldsymbol{\Pi} + \varepsilon_c, \quad (2)$$

where y_c is an outcome of interest, c denotes countries, and Plough_c is our measure of the traditional use of the plough among the ancestors of the citizens in country c. $\mathbf{X}_c^{\mathbf{H}}$ and $\mathbf{X}_c^{\mathbf{C}}$ are vectors of historical ethnographic and contemporary control variables, each measured at the country level.

- Why include control variables?
- Can one overcontrol?

Dangers of Overcontrolling – A Simple Example

Suppose the truth is:

(*) $LFP_i = a + bI_i + cP_i + e_i$,

(**) $I_i = \alpha + \beta P_i + \varepsilon_i$,

where ε is uncorrelated with P, and e is uncorrelated with P and I.

The true effect of P on LFP is $b\beta + c$.

But if we estimate (*) by OLS, the coefficient on P will be c.

A Simple Example (continued)

(*) $LFP_i = a + bI_i + cP_i + e_i$,

(**) $I_i = \alpha + \beta P_i + \varepsilon_i$.

(*) and (**) imply:

(***) $LFP_i = a + b(\alpha + \beta P_i + \varepsilon_i) + cP_i + e_i$

$= (a + \alpha b) + (b\beta + c)P_i + (b\varepsilon_i + e_i)$.

If we estimate (***) by OLS, the coefficient on P will be $b\beta + c$, which is the true effect of P on LFP.

TABLE III

COUNTRY-LEVEL OLS ESTIMATES WITH HISTORICAL CONTROLS

	(1)	(2)
	Female labor force participation in 2000	
Mean of dep. var.	51.03	
Traditional plough use	−14.895***	−15.962***
	(3.318)	(3.881)
Historical controls:		
Agricultural suitability	9.407**	9.017**
	(3.885)	(4.236)
Tropical climate	−8.644***	−12.389***
	(2.698)	(3.302)
Presence of large animals	10.903**	2.35
	(5.032)	(5.956)
Political hierarchies	−0.787	0.447
	(1.622)	(1.624)
Economic complexity	0.170	1.157
	(0.849)	(0.859)
Continent fixed effects	no	yes
Observations	177	177
Adjusted R-squared	0.20	0.24
R-squared	0.22	0.28

From Alesina, Giuliano, and Nunn, “On the Origins of Gender Roles”

Partial Association Scatter Plot

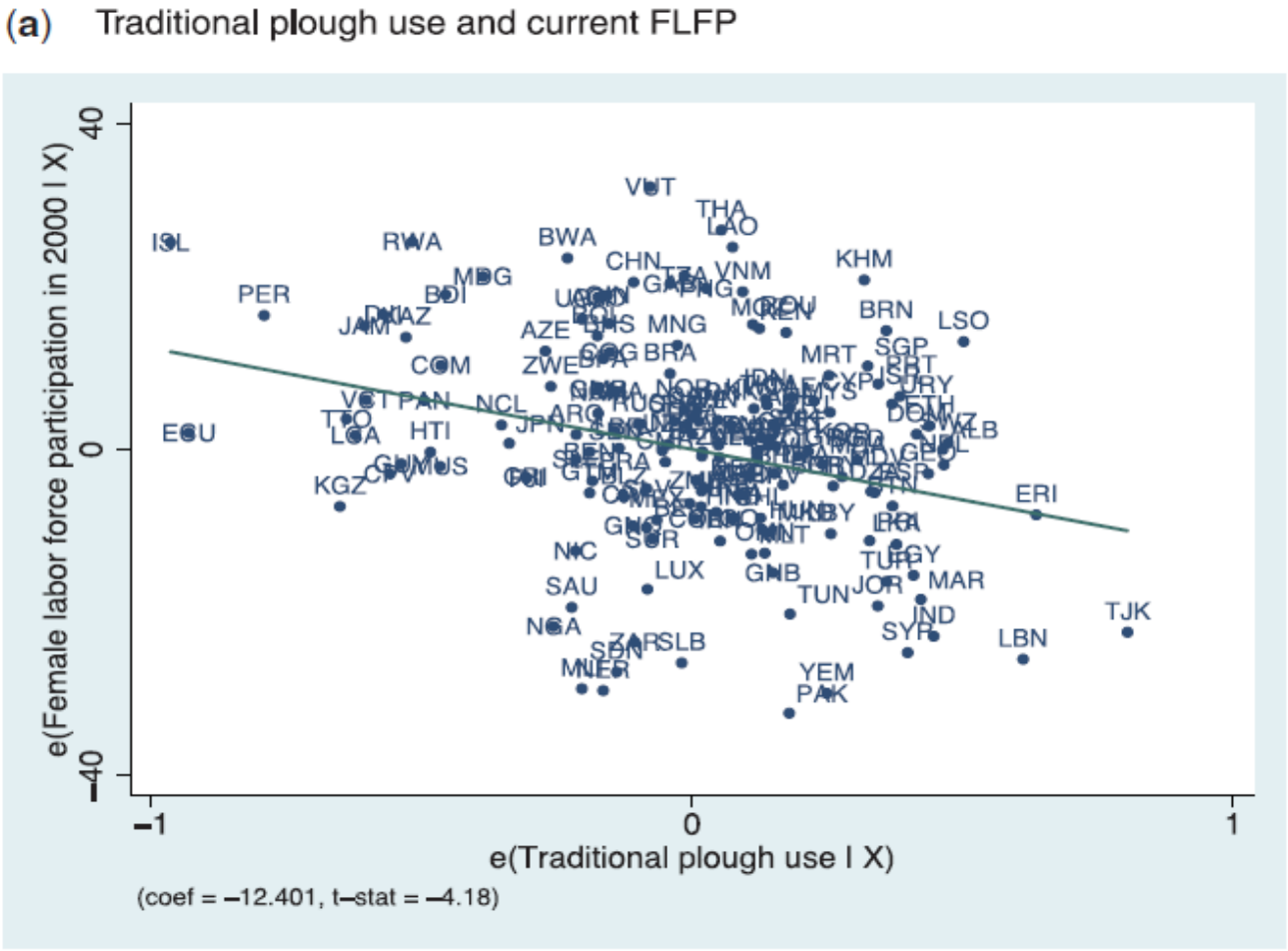

FIGURE IV

Partial Correlation Plots

From Alesina, Giuliano, and Nunn, “On the Origins of Gender Roles”

The Frisch-Waugh Theorem

(1) Estimate $Y_i = aZ_i + b'X_i + e_i$ by OLS (Z_i a scalar, X_i potentially a vector).

(2) (a) Estimate $Y_i = \beta'X_i + \varepsilon_i$ by OLS. Call the residuals u_i's.

(b) Estimate $Z_i = \gamma'X_i + \delta_i$ by OLS. Call the residuals v_i's.

(c) Estimate $u_i = av_i$ by OLS.

Theorem (Frisch and Waugh, 1933): The 2 estimates of a are numerically identical.

Partial Association Scatter Plot

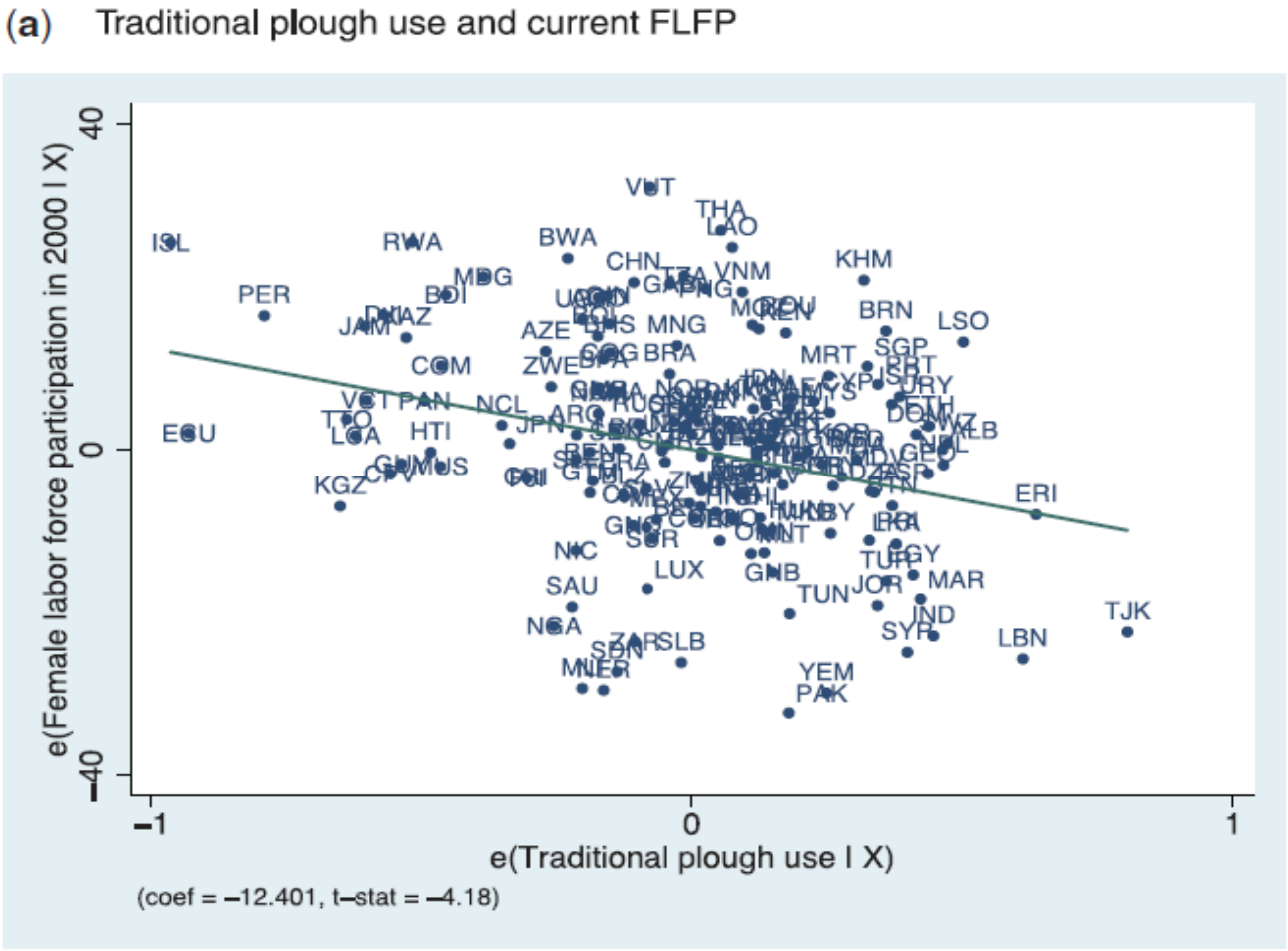

FIGURE IV

Partial Correlation Plots

From Alesina, Giuliano, and Nunn, “On the Origins of Gender Roles”

TABLE V

INDIVIDUAL-LEVEL OLS ESTIMATES USING WVS DATA

	(1)	(2)	(3)	(4)
	Dependent variable:			
	Female labor force participation, 1995–2007		When jobs are scarce, 1995–2007	
Mean of dep. var.	0.55	0.55	0.46	0.47
Traditional plough use	−0.177***	−0.002	0.193***	0.100*
	(0.035)	(0.031)	(0.033)	(0.059)
Individual & district controls	yes	yes	yes	yes
Contemporary country controls	yes	n/a	yes	n/a
Fixed effects	continent	country	continent	country
Number of countries	73	78	74	79
Number of districts	672	698	674	700
Observations	43,801	47,587	80,303	87,528
Adjusted R-squared	0.17	0.27	0.21	0.28
R-squared	0.17	0.27	0.21	0.28

From Alesina, Giuliano, and Nunn, “On the Origins of Gender Roles”

Causation

- Are there possible sources of omitted variable bias?
- What is causing the variation in plough use (conditional on any controls)?

TABLE VIII

COUNTRY-LEVEL 2SLS AND REDUCED-FORM ESTIMATES

	(1)	(2)
	Panel A. First stage 2SLS estimates. Dependent variable: Traditional plough use	
Mean of dep. var.	0.53	
Plough-positive environment	0.744***	0.629***
	(0.084)	(0.089)
Plough-negative environment	0.119	0.185
	(0.122)	(0.133)
Equality of coefficients (p-value)	0.00	0.00
F-stat (plough variables)	40.21	25.06
	Dependent variable (panels B & C):	
	Female labor force participation in 2000	
	Panel C. Second-stage 2SLS estimates	
Traditional plough use	−21.630***	−25.013***
	(5.252)	(7.513)
Hausman test (p-value)	0.02	0.04
Hansen J	0.00	0.00
Historical & contemporary controls	yes	yes
Continent FEs	no	yes
Observations	160	160

From Alesina, Giuliano, and Nunn, “On the Origins of Gender Roles”

TABLE IX

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

Notes. OLS estimates are reported with standard errors clustered at the country level. An observation is a daughter of an immigrant to the United States, surveyed between 1994 and 2011. "Traditional plough use" is the fraction of citizens with ancestors that used the plough in pre-industrial agriculture in the father's country of origin of the children of immigrants. The mean (and standard deviation) for this variable is 0.570 (0.454); this corresponds to the sample from column 1. All regressions include: state-of-residence fixed effects, individual controls (age, age squared, educational attainment fixed effects for less than high school, high school, more than high school, an indicator variable for being single, year of survey fixed effects, and metropolitan fixed effects for within metropolitan central city, outside of metropolitan central city, and not living in a metropolitan area), historical country controls (ancestral suitability for agriculture, fraction of ancestral land that was tropical or subtropical, ancestral domestication of large animals, ancestral settlement patterns, and ancestral political complexity), and contemporaneous country controls (the natural log of real per capita GDP and its square, measured in the same year as the dependent variable). Columns 4–9 also include husband controls (husband's age, age squared, husband's educational attainment fixed effects for less than high school, high school, and more than high school, and husband's natural log of real wage income). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

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