Endogenous Democracy: Causal Evidence from the Potato Productivity Shock in the Old World

Online Appendix (Supplemental Material)

Contents

A Instruments for development in extant research

Acemoglu et al. (2008)

- National *saving rates* from $t-5$ to $t-1$

  - The exclusion restriction fails if "saving rates might be correlated with future anticipated regime changes" (Acemoglu et al., 2008, 810). Research suggests that saving rates reflect current conditions but, especially, future anticipated conditions, including ongoing shifts in a country's institutional dynamics (Schmidt-Hebbel, Serven and Solimano, 1996).
  - Furthermore, saving rates at time $t-5$ are likely to be endogenous to macroeconomic conditions at $t-5$, which are also likely to be associated with economic development at t, and with political institutions at $t+5$. As Angrist and Krueger point out, "the use of lagged endogenous variables as instruments is problematic if the equation error or the omitted variables are serially correlated" (Angrist and Krueger, 2001, 77).

- National *predicted income based on contemporary incomes of trading partners*

  - Consider the possibility that A trades equally with B and C. Based on this design, A's income is highly correlated with the incomes of B and C, and this is the only channel by which incomes in B and C could possibly influence country A's level of democracy. Yet, it follows that income in A also influences incomes in B and C, leading to a feedback relation among countries, especially among those with a small circle of trading partners, that may violate SUTVA.
  - A number of omitted variables — war, decolonization, diffusion effects through global networks — may easily affect incomes in A, B, and C simultaneously, while contemporaneously affecting country A's political regime.
  - Boix (2011) cannot reject the null hypothesis that this instrument is weak based on a Stock-Yogo test for a fully-specified model with country and year-FE.
  - Trade affects income, but it also likely transmits ideas, innovation, and cultural predispositions that may lead to regime change, violating the exclusion restriction.

Boix (2011)

- A country's *genetic distance to economic pace-setter* interacted with *time trend*

  - Boix (2011) follows Spolaore and Wacziarg (2009) in building a relative genetic distance measure, which is the distance between the genetic imprint of a country's population relative to the population of the economic pace-setters, which are the United Kingdom in the nineteenth century and the United States in the twentieth century.

  - But genetic distance may conflate important confounders. Spolaore and Wacziarg (2009, 495-502) suggests controlling for shared geographic conditions with another country, but this control does not appear in Boix (2011).

- National *ratio of domestic-to-world income in 1850* interacted with *world median income*

  - This instrument exploits two facts: the correlation between income and democracy does not appear until 1850, and a country's position in income relative to the world in 1850 is a strong predictor of a country's position in income in the subsequent century. But the validity of the instrument requires a strong assumption that the conditions that favor economic development are not also conditions that favor democratization in the future and, thus, that the lack of a pre-1850 correlation between income and democracy is the result of sequential stages, and not of processes that have a common root but differential timing.

- National *ratio of domestic-to-world income in 1850* interacted with *time trend*

  - See above

Gundlach and Paldam (2009)

- A country's *estimate of the number of domesticable big mammals and annual perennial wild grasses in the prehistoric era* interacted with *bio-geographic characteristics* (e.g., climate, number of frost days in winter, proportion of coastline)

  - Research shows a strong relationship between historical geographic conditions and past income (Diamond, 1997), making *historical* geographic conditions an appealing instrument for *current* economic conditions.
  - But the exclusion restriction could be violated because historical geographic conditions affected the timing of the Neolithic revolution (Ashraf and Michalopoulos, 2015), and this historical transition from foraging to farming has a strong predictive power on the early development of state institutions (Hariri, 2012).

B Coding decisions regarding Polity scores

We explain the coding rules we follow to obtain a complete and consistent set of Polity scores. The main quandary we face is that NQ, and we as well, use current-day countries as units of analysis. Because Polity scores are coded at the level of the political unit, and because current political units (nation states) are often successors to prior political units (empires or colonial states), we need to follow specific coding rules to harmonize Polity score assignments.

Thus, there are many contemporaneous states that appeared after the dissolution of long-standing imperial units. For example, a number of states in the Balkans and the Middle East peeled away from the Ottoman Empire in the nineteenth-century; by the end of World War I, which sounded the death knell of this and other empires, some other vassal regions became independent entities, though many others became protectorates of France or Great Britain. Countries that are currently independent but formed part of a more extensive empire or multinational state receive the Polity score of the "tutelar" country at the time of observation (i.e., Serbia in 1800 receives Turkey's 1800 score, as Turkey was the "tutelar" country in the Ottoman Empire, but Serbia in 1950 receives Yugoslavia's score). For the most part, this decision is relatively unproblematic, as the tutelar nation in an empire commonly receives a score of -10, corresponding to a closed autocracy.

Additionally, we distinguish among countries that were protectorates or colonies of a European power and those territories that, while independent from colonial domination, cannot be seen as having stable state structures. Such is the case, for example, of the Congo, which was partitioned among a number of tribal, semi-stable political units before the scramble for Africa's colonization in the latter half of the nineteenth century. Such political units are too far from resembling a modern state to warrant inclusion in our sample.

We code *all* political units in 1750 and before as closed autocracies, which receive a *Polity* score of -10. This means that the effects we estimate are not informed at all by observations prior to 1750, as there is no variation there in the outcome variable (in Appendix E we show that this decision has no bearing on our conclusions). Table B1 includes detailed information about our coding decisions.

Table B1: Coding decisions regarding Polity scores

	Polity score at			
Country	1800	1850	1900	1950
Afghanistan	Original polity score	Original polity score	Original polity score	Original polity score
Albania	Turkey polity score	Turkey polity score	Turkey polity score	Russia polity score
Algeria	Turkey polity score	Turkey polity score	Turkey polity score	France colony
Angola	Portugal colony	Portugal colony	Portugal colony	Portugal colony
Armenia	Turkey polity score	Turkey polity score	Turkey polity score	Russia polity score
Australia	United Kingdom score	United Kingdom score	United Kingdom score	Original polity score
Austria	Original polity score	Original polity score	Original polity score	Original polity score
Azerbaijan	Iran polity score	Russia polity score	Russia polity score	Russia polity score
Bahrain	Al Khalifa royal family	Al Khalifa royal family	British protectorate	British protectorate
Bangladesh	British colony	British colony	British colony	India polity score
Belarus	Russia polity score	Russia polity score	Russia polity score	Russia polity score
Belgium	France polity score	Original polity score	Original polity score	Original polity score
Benin	Independent kingdom subservient to Portugal	Independent kingdom subservient to Portugal	French colony	French colony
Bhutan	Absolute monarchy	Absolute monarchy	Absolute monarchy	Original polity score
Bosnia and Herzegovina	Turkey polity score	Turkey polity score	Turkey polity score	Original polity score

Continued on next page

Table B1 — continued from previous page

Country	1800	1850	1900	1950
Botswana	No state	No state	English protectorate	English protectorate
Bulgaria	Turkey polity score	Turkey polity score	Original polity score	Original polity score
Burkina Faso	No state	No state	French protectorate	French colony
Burundi	No state	No state	German colony	Belgian protectorate
Cambodia	No state	Joint Thailand-Vietnam control	French protectorate	French protectorate
Cameroon	No state	No state	German colony	UK-French protectorate
Central African Republic	No state	No state	French colony	French colony
Chad	No state	No state	No state	French colony
China	Original polity score	Original polity score	Original polity score	Original polity score
Comoros	No state	French colony	French colony	French colony
Congo Brazzaville	No state	No state	French colony	French colony
Congo, Democratic Republic	No state	No state	Belgian colony	Belgian colony
Cote d'Ivoire	Native kingdoms	French colony	French colony	French colony
Croatia	Turkey polity score	Turkey polity score	Turkey polity score	Yugoslavia polity score
Cyprus	Turkey polity score	Turkey polity score	British colony	British colony
Czech Republic	Austria polity score	Austria polity score	Austria polity score	Czechoslovakia polity score
Denmark	Original polity score	Original polity score	Original polity score	Original polity score
Djibouti	Turkey polity score	Turkey polity score	French colony	French colony
Egypt	Turkey polity score	Turkey polity score	English colony	Original polity score
Equatorial Guinea	Spanish colony	Spanish colony	Spanish colony	Spanish colony
Eritrea	Turkey polity score, Turkey controlled seaboard	Turkey polity score, Turkey controlled seaboard	Italian colony	Ethiopia polity score
Estonia	Russia polity score	Russia polity score	Russia polity score	Russia polity score
Ethiopia	No central state	No central state	Original polity score	Original polity score
Fiji	British colony	British colony	British colony	British colony
Finland	Sweden score	Russia polity score	Russia polity score	Original polity score
France	Original polity score	Original polity score	Original polity score	Original polity score
Gabon	No state	No state	French colony	French colony
Gambia	No state	British colony	British colony	British colony
Georgia	Russia polity score	Russia polity score	Russia polity score	Russia polity score
Germany	Prussia polity score	Prussia polity score	Germany polity score	West Germany polity score
Ghana	Ashanti kingdom, European colonies	Ashanti kingdom, European colonies	Ashanti kingdom, European colonies	Ashanti kingdom, European colonies
Greece	Turkey polity score	Original polity score	Original polity score	Original polity score
Guinea	No unified state	No unified state	French colony	French colony
Guinea-Bissau	Portuguese colony	Portuguese colony	Portuguese colony	Portuguese colony
Hungary	Austria polity score	Austria polity score	Original polity score	Original polity score
India	British colony	British colony	British colony	Original polity score
Indonesia	Dutch colony	Dutch colony	Dutch colony	Original polity score
Iran	Original polity score	Original polity score	Original polity score	Original polity score
Iraq	Turkey polity score	Turkey polity score	Turkey polity score	Original polity score
Ireland	United Kingdom score	United Kingdom score	United Kingdom score	Original polity score
Israel	Turkey polity score	Turkey polity score	Turkey polity score	Original polity score
Italy	Average of Austria and Spain	Average of Modena, Papal States, Parma, Sardinia, Two Sicilies, Tuscany	Original polity score	Original polity score
Japan	Original polity score	Original polity score	Original polity score	Original polity score
Jordan	Turkey polity score	Turkey polity score	Turkey polity score	Original polity score
Kazakhstan	Kazakh Khanate	Russia polity score	Russia polity score	USSR polity score
Kenya	No unified state	No unified state	British colony	British colony
Korea, DPR	Original polity score	Original polity score for Korea	Original polity score for Korea	Original polity score
Korea, Republic	Original polity score for Korea	Original polity score for Korea	Original polity score	Original polity score
Kuwait	Seems to be independent of Persia	Seems to be independent of Persia	British protectorate	British protectorate
Kyrgyzstan	Uzbekh score	Russia polity score	Russia polity score	USSR polity score

Continued on next page

Table B1 — continued from previous page

Country	1800	1850	1900	1950
Laos	Thai-Burma domination	Thai domination	French colony	French colony
Latvia	Russia polity score	Russia polity score	Russia polity score	USSR polity score
Lebanon	No unified state	Turkey polity score	French protectorate	Original polity score
Lesotho	No state	No state	British protectorate	British colony
Liberia	No state	Original polity score	Original polity score	Original polity score
Libya	Turkey polity score	Turkey polity score	Turkey polity score	Original polity score (1951)
Lithuania	Russia/Prussia polity score	Russia polity score	Russia polity score	USSR polity score
Macedonia	Turkey polity score	Turkey polity score	Turkey polity score	Yugoslavia polity score
Madagascar	Independent kingdom	Independent kingdom	French colony	French colony
Malawi	No state	No state	British protectorate	British protectorate
Malaysia	British colony	British colony	British colony	British colony
Mali	No state	No state	French colony	French colony
Mauritania	No state	No state	French colony	French colony
Mauritius	French colony	British colony	British colony	British colony
Moldova	Turkey polity score	Russia polity score	Russia polity score	USSR polity score
Mongolia	Manchu rule	Manchu rule	Manchu rule	Original polity score
Morocco	Original polity score	Original polity score	Original polity score	Interruption
Mozambique	Portuguese colony	Portuguese colony	Portuguese colony	Portuguese colony
Myanmar	Unified state	British colony	British colony	Original polity score
Namibia	No state	No state	German colony	South Africa protectorate
Nepal	Original polity score	Original polity score	Original polity score	Original polity score
Netherlands	Batavian republic	Original polity score	Original polity score	Original polity score
New Zealand	No state	No state	Original polity score	Original polity score
Niger	No unified state	Kanem Empire	French colony	French colony
Nigeria	No unified state	British protectorate	British protectorate	British colony
Norway	Denmark-controlled	Original polity score	Original polity score	Original polity score
Oman	Original polity score	Original polity score	Original polity score	Original polity score
Pakistan	British colony	British colony	British colony	Original polity score
Portugal	Original polity score	Original polity score	Original polity score	Original polity score
Papua New Guinea	No state	No state	German and British colonies	Australian protectorate
Philippines	Spanish colony	Spanish colony	Philippine-American war	Original polity score
Poland	Partitioned	Partitioned	Partitioned	Original polity score
Qatar	Saudi rule	Independent rule	Turkey polity score	British protectorate
Romania	Turkey polity score	Turkey polity score	Original polity score	Original polity score
Russian Federation	Original polity score	Original polity score	Original polity score	USSR polity score
Rwanda	Kingdom of Rwanda	Kingdom of Rwanda	German colony	Belgian colony
Saudi Arabia	Saudi kingdom	Saudi kingdom	Turkey polity score	Original polity score
Senegal	No state	French colony	French colony	French colony
Serbia and Montenegro	Turkey polity score	Original polity score	Original polity score	Yugoslavia polity score
Sierra Leone	British colony	British colony	British colony	British colony
Singapore	Unclear	British colony	British colony	British colony
Slovakia	Austria polity score	Austria polity score	Austria polity score	Czechoslovakia polity score
Slovenia	Turkey polity score	Turkey polity score	Turkey polity score	Yugoslavia polity score
Solomon Islands	No state	No state	British protectorate	British protectorate
Somalia	Sultanate	Sultanate	Dervish state	British protectorate
South Africa	British colony	British colony	British colony	Original polity score
Spain	Original polity score	Original polity score	Original polity score	Original polity score
Sri Lanka	Sri Raj	British colony	British colony	Original polity score
Swaziland	Semi-independent kingdom	Semi-independent kingdom	Semi-independent kingdom	British colony
Sweden	Original polity score	Original polity score	Original polity score	Original polity score
Switzerland		Original polity score	Original polity score	Original polity score
Syria	Turkey polity score	Turkey polity score	Turkey polity score	Original polity score
Taiwan	Qing rule	Qing rule	Japanese colony	Original polity score
Tajikistan	Khanate	Khanate	Russia polity score	USSR polity score
Tanzania	Omani Sultanate	Omani Sultanate	German colony	British protectorate
Thailand	Original polity score	Original polity score	Original polity score	Original polity score
Togo	No state	No state	German colony	British-French protectorate

Continued on next page

Table B1 — continued from previous page

Country	1800	1850	1900	1950
Tunisia	Turkey polity score	Turkey polity score	French colony	French colony
Turkey	Original polity score	Original polity score	Original polity score	Original polity score
United Arab Emirates	Independent emirates	Independent emirates	Independent emirates	Independent emirates
Uganda	No state	No state	British colony	British colony
Ukraine	Russia polity score	Russia polity score	Russia polity score	USSR polity score
United Kingdom	Original polity score	Original polity score	Original polity score	Original polity score
Uzbekistan	Divided in three khanates	Russia polity score	Russia polity score	USSR polity score
Viet Nam	Nguyen rule	Nguyen rule	French colony	French colony
Yemen	Turkey polity score	Turkey polity score	Turkey polity score	British protectorate
Yemen North	Turkey polity score	Turkey polity score	Turkey polity score	British protectorate
Zambia	No central state	No central state	No central state	British protectorate
Zimbabwe	Rozwi Empire	Ndebele Kingdom	British colony	British colony

C Descriptive statistics

Table C1: Descriptive statistics for all variables in Table 1

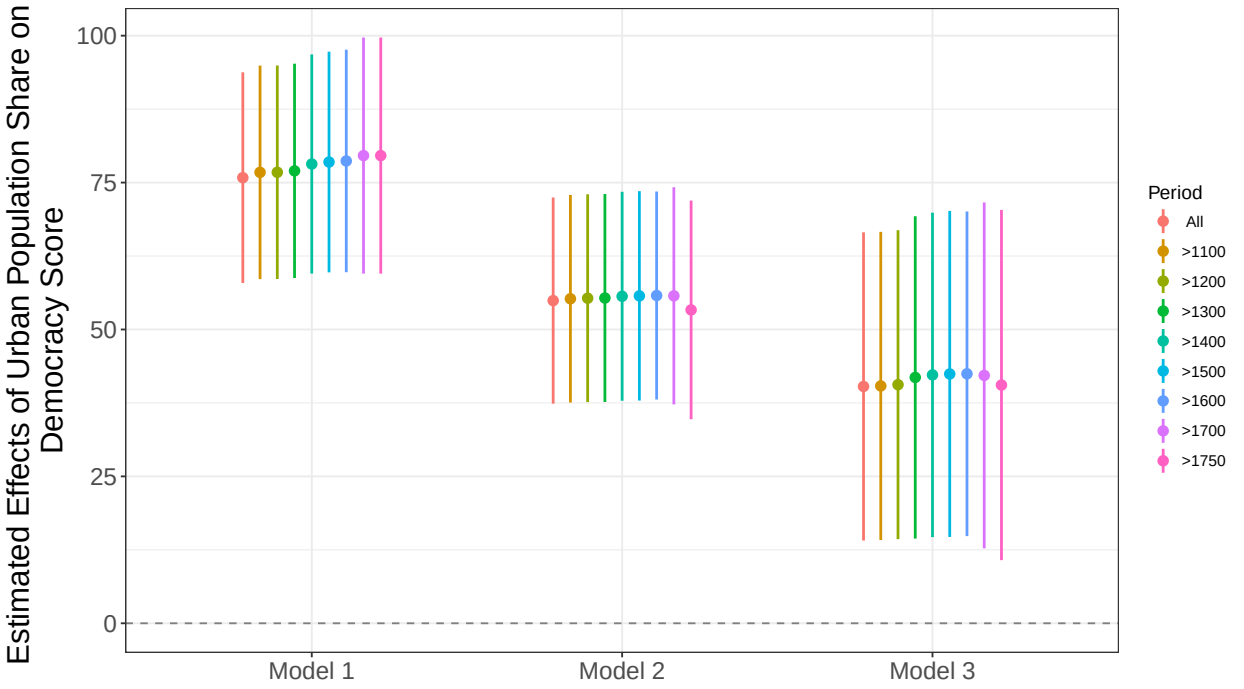
Statistic	N	Mean	SD	Min	Max
Polity Score	1,552	−8.20	4.87	−10	10
Share of Urban Population	1,552	0.02	0.05	0	0.54
Potato Suitable Area (log scale)	1,552	0.31	1.46	0	11.89
Old World Crop Area (log scale)	1,552	0.59	2.13	0	12.06
Elevation (log scale)	1,552	0.50	1.68	0	8.00
Ruggedness (log scale)	1,552	−0.02	0.31	−3.31	1.91
Tropical Area (log scale)	1,552	0.32	1.74	0	12.31

D Robustness checks: Restricting pre-1800 periods

The main analysis uses a sample that extends back to 1000. Given our coding of democracy levels prior to 1800, which are all constant at −10, one may argue that while there is no between-unit variation from 1000 to 1800, this part of the sample might still somehow contribute to the coefficient estimates. Put it differently, one might wonder whether our finding is an artifact of the inclusion of pre-1800 periods for which we have no variation in the outcome. We believe that precisely because the effect of the potato productivity shock exerts negligible effects before 1800 and there is no variation in the dependent variable, our main effects should not be informed by observations prior to 1800 (they are not in our models). In any case, this Appendix empirically clarifies this concern.

Figure D1 reports a re-estimation of the the three models presented in Table 1 after excluding observations prior to 1100, 1200, 1300, 1400, 1500, 1600, 1700, and 1750. The benchmark is the red vertical line — the category "All" — which corresponds to the estimate of instrumented urban population shares on democracy based on all observations (these are the coefficients that we report in Table 1). The results show that the coefficient estimates are not sensitive to the exclusion of pre-1800 periods used in the analysis.

Figure D1: The effect of urbanization on democracy after successively excluding observations prior to 1800



E Sensitivity to violations of the exclusion restriction

We believe that the interaction between potato suitability and the timing of the introduction of potatoes is a valid instrument to estimate the impact of urbanization on democracy. However, we acknowledge that there is always a chance that a plausible IV is invalid, and that our inferences are sensitive to violations of the exclusion restriction. In this appendix, we present a formal sensitivity analysis to examine the impact of relaxing the exclusion restriction assumption on our main estimate.

For this task, we use the approach proposed by Conley, Hansen and Rossi (2012), who provide a suitable method to implement sensitivity analyses within an instrumental-variables framework. This method considers the statistical significance of the IV estimate of the causal effect of interest as a function of a sensitivity parameter γ, set by the researcher, that captures the magnitude of association between the putative IV and potential unmeasured confounders that transmit the effect of the IV on the outcome through paths distinct from the instrumented variable. Thus, we now let the instrument enter our second-stage regression with a coefficient of γ, as in the following equation:

$$\text{Polity}_{i,t+1} = \alpha\ \text{Urbanization}_{it} + \gamma(\text{Potato suitability}_i \cdot \text{I}_t^{\text{Post}}) + \sum_{j=1000}^{1900} \mathbf{X}_i' \mathbf{I}_t^j \lambda_j + \\ + \sum_c \xi_c \text{I}_i^c + \sum_{j=1000}^{1900} \phi_j \text{I}_t^j + \nu_{it}.$$

In this equation, we set γ within a range that captures feasible violations of the exclusion restriction. This equation is estimated by the UCI (Union of Confidence Intervals) approach, the simplest (and most conservative) methodology provided in Conley, Hansen and Rossi (2012) which substitutes "the original assumption that γ=0 with an assumption about the minimum and the maximum values that γ may take" (Clarke and Matta, 2018, 667). This produces confidence intervals on α, the ultimate quantity of interest, at a chosen level of significance.

First, as the effect of the potato productivity shock on democracy is positive, we fix the lower bound of γ at 0 (no effect), so the exclusion restriction is allowed to have support $\in [0, \bar{\gamma}]$. For each model in Table 1, Table E1 gives the union of 95% and 90% confidence intervals around the 2SLS estimates of α assuming direct treatment effects bounded below by zero and above by $\bar{\gamma}$, which we incrementally assume larger and larger. We contextualize the restrictions on $\bar{\gamma}$ as the percentage of the reduced-form average treatment effect of the potato productivity shock on democracy for the periods 1700-1900. These average effects, which are not reported in the text, are 0.50, 0.46, and 0.24, respectively, for each of the three models in Table 1. Consequently, moving from 10% to 20% of the reduced-form average treatment effect corresponding to model 1 (i.e., 0.50) implies increasing $\bar{\gamma}$ from 0.05 to 0.1.

Table E1 shows that the estimated effect of urbanization on democracy would still be significantly positive even after allowing for increases of some unidentified, unmeasured confounder of up to 40% of the reduced-form estimate at the 95% confidence level in the estimates from Model 3. When we consider the results for the 90% confidence level, the

percentage at which the main estimate remains significant is equivalent to 60% of the reduced-form estimate. In other words, the estimated effect of *urbanization* on *democracy* would still be significant at the 90% confidence level if up to 60% of the effect of the *potato productivity shock* on *democracy* occurred through some unforeseen channel different than *urbanization* (after controlling of course for all other potential shocks, and for period and country fixed effects.) This result demonstrates that the main effect of development on democracy is fairly robust, even if the exclusion restriction were violated to a substantial extent.

Table E1: Sensitivity analysis using Conley test of plausible exogeneity at varying violation sizes)

Violation size (% of reduced-form estimate)	Confidence level	Model 1	Model 2	Model 3
10%	95%	[50.1:102.3]	[29.9:80.1]	[6.09:74.1]
	90%	[54.8:97.3]	[34.6:75.3]	[13.0:67.1]
20%	95%	[46.2:107.0]	[26.3:84.0]	[3.3:76.5]
	90%	[50.7:101.9]	[30.9:79.2]	[10.3:69.5]
30%	95%	[42.3:111.8]	[22.6:88.1]	[0.45:78.9]
	90%	[46.7:106.5]	[27.10:83.11]	[7.44:71.86]
40%	95%	[38.3:116.6]	[18.8:92.1]	**[–2.43:81.27]**
	90%	[46.7:106.5]	[23.3:87.0]	[4.6:74.3]
60%	95%	[29.98:126.16]	[5.98:105.53]	**[–8.33:86.22]**
	90%	[34.07:120.34]	[10.40:100.13]	**[–1.21:79.13]**
Baseline Controls				
Old World crops×Periods		N	Y	Y
Elevation×Periods		N	N	Y
Ruggedness×Periods		N	N	Y
Tropical Area×Periods		N	N	Y
Fixed Effects				
FE Country		Y	Y	Y
FE Period		Y	Y	Y

Note: Cells report the lower and upper bounds of the estimated coefficient of urbanization using the Union of Confidence Intervals approach at varying sizes of the violation parameter γ, at both the 95% and the 90% confidence levels, one-tailed, respectively. For a full discussion of this method, see Conley, Hansen and Rossi (2012). The standard errors are clustered at the country level.

F Estimates of the effect of urbanization on democracy (full models)

Table F1: First stage estimation of the effect of the potato productivity shock on urbanization, 1100–1950 (full models)

	Democracy score		
Potato suitability×1100	−0.002	−0.001*	−0.001
	(1.24)	(1.42)	(0.50)
Potato suitability×1200	−0.001	−0.001*	−0.001
	(1.19)	(1.43)	(0.96)
Potato suitability×1300	−0.0002	−0.001	0.001
	(0.26)	(0.48)	(0.92)
Potato suitability×1400	0.001	0.0002	0.001
	(0.64)	(0.10)	(0.68)
Potato suitability×1500	0.0003	−0.0002	0.001
	(0.38)	(0.13)	(0.60)
Potato suitability×1600	0.0002	−0.001	−0.00003
	(0.16)	(0.40)	(0.01)
Potato suitability×1700	0.002**	0.002*	0.002*
	(2.07)	(1.31)	(1.44)
Potato suitability×1750	0.001**	0.001	0.001
	(1.65)	(0.84)	(0.76)
Potato suitability×1800	0.002**	0.002*	0.002
	(2.24)	(1.30)	(1.04)
Potato suitability×1850	0.002**	0.002*	0.003**
	(2.25)	(1.57)	(1.80)
Potato suitability×1900	0.012***	0.012***	0.010***
	(5.23)	(5.25)	(3.14)
Old World Crop Suitable Area×1100		−0.001	−0.002
		(0.43)	(0.70)
Old World Crop Suitable Area×1200		0.001	0.000
		(0.40)	(0.17)
Old World Crop Suitable Area×1300		0.001	−0.002
		(0.69)	(0.95)
Old World Crop Suitable Area×1400		0.001	0.000
		(1.16)	(0.26)
Old World Crop Suitable Area×1500		0.001	−0.000
		(0.97)	(0.06)
Old World Crop Suitable Area×1600		0.003	0.002
		(1.04)	(0.49)

Old World Crop Suitable Area×1700	0.001	0.000
	(0.55)	(0.04)
Old World Crop Suitable Area×1750	0.001	0.001
	(0.83)	(0.33)
Old World Crop Suitable Area×1800	0.001	0.001
	(0.75)	(0.41)
Old World Crop Suitable Area×1850	0.000	−0.001
	(0.37)	(0.31)
Old World Crop Suitable Area×1900	−0.001	0.002
	(0.74)	(0.69)
Elevation×1100		0.007*
		(1.35)
Elevation×1200		0.003
		(1.01)
Elevation×1300		0.004
		(1.09)
Elevation×1400		0.002
		(0.48)
Elevation×1500		0.005
		(1.06)
Elevation×1600		−0.002
		(0.19)
Elevation×1700		−0.004
		(0.61)
Elevation×1750		−0.006
		(0.81)
Elevation×1800		−0.006
		(1.00)
Elevation×1850		−0.007
		(1.13)
Elevation×1900		−0.023**
		(2.63)
Ruggedness×1100		−0.010
		(1.15)
Ruggedness×1200		−0.004
		(0.80)
Ruggedness×1300		−0.007*
		(1.40)
Ruggedness×1400		−0.010*
		(1.33)
Ruggedness×1500		−0.006
		(1.02)
Ruggedness×1600		−0.001
		(0.08)
Ruggedness×1700		−0.008

			(1.32)
Ruggedness×1750			−0.005
			(0.80)
Ruggedness×1800			−0.005
			(0.82)
Ruggedness×1850			−0.006
			(0.99)
Ruggedness×1900			−0.006
			(0.59)
Tropical Areas×1100			−0.000
			(0.06)
Tropical Areas×1200			−0.000
			(0.17)
Tropical Areas×1300			0.000
			(0.06)
Tropical Areas×1400			0.000
			(0.45)
Tropical Areas×1500			0.001
			(0.12)
Tropical Areas×1600			0.001
			(1.07)
Tropical Areas×1700			−0.000
			(0.24)
Tropical Areas×1750			−0.000
			(0.18)
Tropical Areas×1800			−0.000
			(0.33)
Tropical Areas×1850			0.000
			(0.32)
Tropical Areas×1900			−0.004**
			(1.70)
Fixed Effects			
FE Country	Y	Y	Y
FE Period	Y	Y	Y
N observations	1552	1552	1552
N countries	130	130	130

Note: ***p<0.01; **p<0.05; *p<0.10. Cells report estimated coefficients with *t*-statistics in parentheses with country-level clusters. The outcome variable is a country's *Urbanization*.

Table F2: IV estimation of the effect of urbanization on democracy, 1100–1950 (full models)

	Democracy score		
$\widehat{\text{Urbanization}}$	75.8***	54.9***	40.3**
	(4.01)	(3.32)	(1.97)
Old World Crop Suitable Area×1100		0.11	0.11
		(0.71)	(0.85)
Old World Crop Suitable Area×1200		0.02	0.03
		(0.26)	(0.53)
Old World Crop Suitable Area×1300		−0.02	0.02
		(0.57)	(0.50)
Old World Crop Suitable Area×1400		−0.09**	−0.06
		(1.73)	(1.16)
Old World Crop Suitable Area×1500		−0.07*	−0.03
		(1.53)	(0.87)
Old World Crop Suitable Area×1600		−0.14**	−0.08*
		(1.71)	(1.39)
Old World Crop Suitable Area×1700		−0.05	−0.02
		(0.79)	(0.19)
Old World Crop Suitable Area×1750		0.10	0.30***
		(1.09)	(2.54)
Old World Crop Suitable Area×1800		0.24**	0.57***
		(1.99)	(3.79)
Old World Crop Suitable Area×1850		0.48***	0.93***
		(2.92)	(5.16)
Old World Crop Suitable Area×1900		0.61***	0.85***
		(2.73)	(2.65)
Elevation×1100			−0.27
			(1.08)
Elevation×1200			−0.14
			(0.90)
Elevation×1300			−0.15
			(0.91)
Elevation×1400			−0.06
			(0.31)
Elevation×1500			−0.18
			(0.83)
Elevation×1600			−0.09
			(0.28)
Elevation×1700			0.22
			(0.72)

Elevation×1750	-0.61^{**}
	(1.70)
Elevation×1800	-1.05^{***}
	(2.46)
Elevation×1850	2.97^{***}
	(3.61)
Elevation×1900	1.33^{*}
	(1.48)
Ruggedness×1100	0.43
	(1.00)
Ruggedness×1200	0.18
	(0.86)
Ruggedness×1300	0.24
	(1.12)
Ruggedness×1400	0.35
	(1.08)
Ruggedness×1500	0.19
	(0.79)
Ruggedness×1600	0.01
	(0.02)
Ruggedness×1700	0.43
	(1.15)
Ruggedness×1750	0.83^{**}
	(1.74)
Ruggedness×1800	1.67^{***}
	(2.71)
Ruggedness×1850	3.00^{***}
	(3.85)
Ruggedness×1900	1.55^{**}
	(1.69)
Tropical Areas×1100	−0.01
	(0.24)
Tropical Areas×1200	−0.01
	(0.41)
Tropical Areas×1300	−0.04
	(0.99)
Tropical Areas×1400	0.02
	(0.45)
Tropical Areas×1500	−0.00
	(0.12)
Tropical Areas×1600	−0.03
	(0.52)
Tropical Areas×1700	−0.02
	(0.74)
Tropical Areas×1750	-0.19^{**}

			(2.58)
Tropical Areas×1800			−0.32***
			(3.30)
Tropical Areas×1850			−0.37***
			(2.80)
Tropical Areas×1900			−0.07
			(0.31)
Fixed Effects			
FE Country	Y	Y	Y
FE Period	Y	Y	Y
N observations	1552	1552	1552
N countries	130	130	130

Note: ***p<0.01; **p<0.05; *p<0.10, one-tailed. Cells report estimated coefficients with t-statistics in parentheses with country-level clusters. The outcome variable is a country's *Polity* score.

References

Acemoglu, Daron, Simon Johnson, James A Robinson and Pierre Yared. 2008. "Income and Democracy." *The American Economic Review* 98(3):808–842.

Angrist, Joshua and Alan B Krueger. 2001. Instrumental variables and the search for identification: From supply and demand to natural experiments. Technical report National Bureau of Economic Research.

Ashraf, Quamrul and Stelios Michalopoulos. 2015. "Climatic fluctuations and the diffusion of agriculture." *Review of Economics and Statistics* 97(3):589–609.

Boix, Carles. 2011. "Democracy, Development, and the International System." *American Political Science Review* 105(4):809–828.

Clarke, Damian and Benjamín Matta. 2018. "Practical considerations for questionable IVs." *The Stata Journal* 18(3):663–691.

Conley, Timothy G., Christian B. Hansen and Peter E. Rossi. 2012. "Plausibly Exogenous." *Review of Economics and Statistics* 94(1):260–272.

Diamond, Jared. 1997. *Guns, germs, and steel: The fates of human societies*. New York, NY: WW Norton & Company.

Gundlach, Erich and Martin Paldam. 2009. "A Farewell to Critical Junctures: Sorting Out Long-Run Causality of Income and Democracy." *European Journal of Political Economy* 25(3):340–354.

Hariri, Jacob Gerner. 2012. "The autocratic legacy of early statehood." *American Political Science Review* 106(03):471–494.

Schmidt-Hebbel, Klaus, Luis Serven and Andres Solimano. 1996. "Saving and Investment: Paradigms, Puzzles, Policies." *The World Bank Research Observer* 11(1):87–117.

Spolaore, Enrico and Romain Wacziarg. 2009. "The Diffusion of Development." *The Quarterly Journal of Economics* 124(2):469–529.