Slides on democracy – empirical papers

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Broad topic: the links between "institutions" and development

Institutions can mean many things. Here: democracy

Question: how does democracy relate to economic development?

Well known richer countries are more free

Two possible chains of causation

$$\begin{aligned} \text{Democracy} &\Rightarrow \text{Growth} \\ \text{Growth} &\Rightarrow \text{Democracy} \end{aligned}$$

First "Growth⇒Democracy" studies: Barro (1999) and Acemoglu et al. (2008)

Then "Democracy⇒Growth": Acemoglu et al. (2015)

Barro (1999)

Belongs to an earlier generation of empirical studies on the links from development to democracy

Uses variation over time and across countries in measures of democracy and GDP/capita

But without fixed effects; results hard to interpret causally (see AJRY below)

Data:

- GDP per capita from Penn World Tables
- Democracy: different scales from Freedom House (freedomhouse.org)
  - Electoral rights, civil liberties; starting from 1972
- Other controls, e.g., education, religion, health

Regression(s):

$$d_{i,t} = a_{0,t} + a_1 d_{i,t-T} + a_2 d_{i,t-2T} + \mathbf{Z}'_{i,t-T} a_3 + u_{i,t}$$

Here t denotes year in which the dependent variable (democracy) is measured, e.g., 1972 (start year for FH), 1975, 1980, 1985, 1990, 1995

T is the lag in years (here 5 years)

$\mathbf{Z}'_{i,t-T}$ contains controls

Actually several regressions with $d_{i,t-T}$, $d_{i,t-2T}$, etc., as dependent variables, called Seemingly Unrelated Regressions (SUR) system; note different intercept

(My conjecture: this is the same as a pooled OLS with time fixed effects, but without country fixed effects; cf. discussion below)

Results (e.g., Table 1)

- Strong effect of past democracy scores: democracy highly persistent
- Positive, significant effects of measures of development: log GDP per capita, education, gender equality in education
- Barro: "...broadly supportive of the idea that more prosperous places are more likely to be democratic"
  - But do the regressions really show that prosperity causes democracy? Other interpretations of regression results?

Persistence of democracy means steady-state effects can be larger than direct effects

Intuitively:

$$\text{estimated permanent effect} = \frac{\text{estimate of coeff. of interest}}{1 - \widehat{a}_1 - \widehat{a}_2}$$

For example, doubling of GDP per capita would raise electoral rights indicator (on a 0-1 scale) by 0.04 in the short run, 0.14 in the long run

Other results, with benchmark controls:

- Positive and significant effect of primary schooling, less for higher education (Tables, 1 3)
- Negative and significant effect of gender gap in primary schooling (Table 1); as noted already
- Negative and barely significant effect of urbanization (Table 1); when controlling for (log) GDP/capita; undonditional correlation positive
- Positive and barely significant effect of (log) population (Table 1)

- Negative and significant effect of oil country dummy (Table 1)
- Positive, insignificant effects of health indicators (Table 3)
- Some negative effects of income inequality, ethnic fractionalization (Table 3)
- Little significant effects of colonial origins (Tables 3, 4)
- Negative significant effects of fraction Muslim, non-religion, and "other" (Tables 3, 4)

Interesting to know, but these are all correlations, hard to say anything about direction of causation

Acemoglu, Johnson, Robinson and Yared (2008)

Motivation:

- Strong positive correlation with measures of democracy and development (levels of GDP/capita) across countries; richer countries more democratic

- Some have suggested a causal relationship, e.g. Barro (1999), but also Lipset (various years); known as the *modernization hypothesis*

- Does development cause democracy? Difficult to answer; would ideally need some exogenous variation in economic development that could not impact democracy

- Short of that, at least we can examine how robust the cross-country correlation is

- Specific question addressed in AJRY: does positive correlation hold when entering country fixed effects?

The important variables:

- Log GDP per capita from World Penn Tables
- Democracy measure from Freedom House (from 1972 (?))
- Democracy measure from Polity IV (from 1800)

Democracy measures normalized to lie between 0 and 1

See cross-sectional plots for year 2000

Strong positive correlations

In 2000, the correlation coefficient between log GDP/capita and democracy was 0.60 for FH measure and 0.54 for Polity IV measure

Even stronger for earlier years

But if economic development caused democracy, as argued by Lipset, then we should also see:

- that the world as a whole becomes more democratic as it grows richer (which seems true, depending on time period), and that

- countries that grew faster democratized more than those than grew more slowly (which is not the case)

Latter often called difference-in-difference estimation

Econometric approach

Create panel: variables measured across several countries and years

- E.g., 20-year intervals: 1960, 1980, 2000

- If N countries, then $3N$ observations

Specification for a **pooled regression** across $3N$ observations

- Dependent variable:
  - Democracy in year t, country i
- Independent:
  - Lagged log GDP/capita (i.e., measured e.g. 20 years back)
  - Lagged democracy
  - Controls (20 years back)

$$d_{i,t} = \text{constant} + \alpha d_{i,t-1} + \gamma y_{i,t-1} + \mathbf{x}'_{i,t-1}\beta + u_{i,t}$$

Specification for a **fixed-effects regression**

- Add indicator variables ("dummies") for both year and country

$$d_{i,t} = \alpha d_{i,t-1} + \gamma y_{i,t-1} + \mathbf{x}'_{i,t-1}\beta + \underbrace{\mu_t + \delta_i}_{\text{FE's}} + u_{i,t}$$

- No constant term needed since the FE's do that job

Results: see Tables 2, 3 in paper; attached regressions

- Pooled OLS: $\widehat{\gamma} > 0$ and significant

- With FE's: $\widehat{\gamma} > 0$ or $\widehat{\gamma} < 0$; and $\gamma = 0$ cannot be rejected

Results hold with these **robustness checks**:

- Both measures of democracy (Tables 2, 3)
- Different panel structures (5, 10, 20, 25 years) (Tables 2, 3)
- When controlling for education, age structure (Table 4)
- Instrumenting log GDP/capita with lagged savings/investment rates (Table 5)
- Instrumenting log GDP/capita with incomes of trading partners (Table 6)

- Longer time horizons (>100 years) using GDP/capita data from Maddison (Table 7)

What explains the strong positive cross-country correlation?

AJRY's suggested explanation: **divergence at some critical juncture**

Idea for data generating process

$$\begin{aligned} d_{i,t} &= \gamma y_{i,t-1} + \delta_i^d + u_{i,t}^d \\ y_{i,t} &= \delta_i^y + u_{i,t}^y \end{aligned}$$

δ_i^y, δ_i^d capture factors that affect country i's democracy and income, respectively

Suppose outcomes are measures at two points in time, T (today) and $T - S$ (S periods ago, say 500 years ago)

Take difference between these dates:

$$\begin{aligned} d_{i,T} - d_{i,T-S} &= \gamma \left(y_{i,T} - y_{i,T-S} \right) + u^d_{i,T} - u^d_{i,T-S} \\ &= \gamma \left(u^y_{i,T} - u^y_{i,T-S} \right) + u^d_{i,T} - u^d_{i,T-S} \end{aligned}$$

where we use $y_{i,T} - y_{i,T-S} = u^y_{i,T} - u^y_{i,T-S}$; note typo in eq. (9) and below in AJRY

Difference-in-difference (or fixed-effects) estimator of γ

$$\widehat{\gamma} = \frac{\mathsf{Cov}(d_{i,T} - d_{i,T-S}, y_{i,T} - y_{i,T-S})}{\mathsf{Var}(y_{i,T} - y_{i,T-S})}$$

$$\mathsf{plim}\ \widehat{\gamma} = \gamma + \frac{\mathsf{Cov}(u^y_{i,T} - u^y_{i,T-S}, u^d_{i,T} - u^d_{i,T-S})}{\mathsf{Var}(u^y_{i,T} - u^y_{i,T-S})}$$

Can we assume Cov$(u^y_{i,T} - u^y_{i,T-S}, u^d_{i,T} - u^d_{i,T-S}) = 0$?

AJRY argue not: shocks to output growth have been large in countries with large (positive) democracy shocks too

$$\begin{aligned} u^d_{i,t} &= \eta^d_{i,t} + \xi^d_{i,t} \\ u^y_{i,t} &= \eta^y_{i,t} + \xi^y_{i,t} \end{aligned}$$

Assume that $\xi^j_{i,t}$ has zero correlation over time for $j = d, y$, and that $\xi^d_{i,t}$ is uncorrelated with $\xi^y_{i,t}$, simultaneously and across all periods; argument below should hold if $\xi^j_{i,t} = 0$ for $j = d, y$ and all t (?)

Then let $\eta^d_{i,t}$ and $\eta^y_{i,t}$ follow random walks:

$$\begin{aligned} \eta^d_{i,t} &= \eta^d_{i,t-1} + \nu^d_{i,t} \\ \eta^y_{i,t} &= \eta^y_{i,t-1} + \nu^y_{i,t} \end{aligned}$$

where $\nu^d_{i,t}$ and $\nu^y_{i,t}$ are mostly (close to) uncorrelated, except in some period T^*

$$\text{Cov}(\nu^d_{i,t}, \nu^y_{i,t}) = \begin{cases} \sigma^2_{T^*} >> 0 & \text{if} \quad t = T^* \\ \\ \sigma^2_{\sim T^*} \simeq 0 & \text{if} \quad t \neq T^* \end{cases}$$

In words: T^* is the critical juncture

Should give Eq. (11) in the paper (can you derive it?)

$$\text{plim } \widehat{\gamma} = \begin{cases} \gamma + \dfrac{S\sigma^2_{\sim T^*}}{S\sigma^2_{\nu y} + 2\sigma^2_{uy}} & \text{if } \; T^* \notin [T-S, T] \\ \gamma + \dfrac{S\sigma^2_{\sim T^*} + (\sigma^2_{T^*} - \sigma^2_{\sim T^*})}{S\sigma^2_{\nu y} + 2\sigma^2_{uy}} & \text{if } \; T^* \in [T-S, T] \end{cases}$$

Note 1: recall $\sigma^2_{T^*} >> 0$, $\sigma^2_{\sim T^*} \simeq 0$; means bias larger if CJ happened between points of measurement, $T - S$ and T

Note 2: if $\sigma^2_{\sim T^*} > 0$, then bias grows larger as S grows, even if CJ did not happen between points of measurement

Illustrate in two diagrams

Both with time on horizontal axis

Three different points in time: $T - S$, T, T^*

Here: $T^* \in [T - S, T]$

At T^*, some countries get simultaneous shocks to the processes that govern both $d_{i,t}$ and $y_{i,t}$

Spurt in both $d_{i,t}$ and $y_{i,t}$ for some countries, others not

Test of Critical Juncture hypothesis

Compile cross-country data on GDP/capita and democracy in 1500 and 2000

- GDP/capita in 1500 from Maddison

- Democracy in 1500: based on "constraints on the executive" score from Acemoglu et al. (AER 2005, "Rise of the Atlantic"), which constitutes one component when computing Polity IV democracy score

- Other controls, meant to proxy for (timing of?) Critical Juncture: (1) date of independence, and constraints on the executive in 1500; (2) religion

Results in Tables 8A-B

- Regression as in eq. (9): $d_{i,T} - d_{i,T-S} = \gamma \left(y_{i,T} - y_{i,T-S} \right)$ +error term; $T = 2000$, $S = 500$

- Change in log GDP/capita between 1500 and 2000 has significant and positive correlation with change in democracy

- Relationship weakened when entering "proxies" for CJ (Table 8A); knocked out when looking only at former colonies (8B)

Acemoglu, Naida, Restrepo, and Robinson (2015)

Examine Democracy⇒Growth link

- Democracy measured as new dichotomous variable: 0 or 1
- Unbalanced panel: 175 countries, 1960-2010
- Variables: GDP/capita, democracy, various controls; fixed effects
- Dynamic panel: allow for several lags in (log) GDP per capita
  - Crucial, because democratizations happen in economic downturns (see Figure 1)

Baseline regression equation

$$y_{c,t} = \beta D_{c,t} + \sum_{i=1}^{p} \gamma_j y_{c,t-j} + \mathbf{x}'_{i,t-1}\beta + \underbrace{\alpha_c + \delta_t}_{\text{FE's}} + \varepsilon_{c,t}$$

Results; see Table 2 (here focus on the "within"-estimators)

- Positive, significant effect of democratization ($D_{c,t}$ switching from 0 to 1)
- Column 1: about 1%-point increase in GDP/capita in the same year ($\widehat{\beta} \simeq 1$)

- Much larger in the longer run; long-run effect about 22%-points in Column 4, computed as

$$\frac{\widehat{\beta}}{1 - \sum_{i=1}^{p} \widehat{\gamma}_j}$$

Robustness checks

- Alternative estimators to control for various biases associated with within-estimators; see Columns 5-12 in Table 2

- Adding year-FE's $\times$ dummies for income quantiles in 1960 in Column 2, Table 3
  - Idea: initial development could matter for what paths countries follow

- Dummies for USSR+satellites, interacted with dummies for the years 1989-1991, and all a dummy for post-1992: results not driven by fall of communism; effect of democracy increases; Column 3, Table 3

- Trade (exports+imports over GDP), 4-year lags: Column 4, no change in results

- Dummies for unrest social (riots, revolts), 4-year lags: Column 5, no change in results

- Region $\times$ initial regime $\times$ year effects: Does being democracy in 1960 and in some region matter for what happens next? Column 6, no change in results

- Lags of financial flows (net foreign assets over GDP); idea being that new democracies receive lots of aid. Many observations lost. Column 7, no change in results

IV analysis

Regional waves of transitions to/from democracy; once a first country transits, others follow

- Latin America in 1970's to nondemocracy; then democracy in 1980-90's
- Fall of USSR
- (Arab Spring?)

Use this to construct instrument

Seven regions: Africa, East Asia+Pacific, Eastern Europe, Central Asia, Western Europe+offshoots, Latin America+Caribbean, Middle East+North Africa, South Asia

In each region/year first look at those that start off in 1960 as nondemocratic: then for each country calculate the fraction of the other countries in that group (of initial non-democracies in that region) that are democratic (excluding the country itself); see Figure 6

Then look at those that start off in 1960 as democratic: for each of those countries calculate the fraction of the other countries in that group that are nondemocratic after the first to become nondemocratic (excluding that country itself)

Note: prior to the first country becoming democratic all were non-democratic, and vice versa for nondemocracies

Generates a "wave variable" that varies over time, across countries, and initial regime type (democratic or not in 1960)

This wave variable is the instrument, with various lags

Results in Table 5:

- Instrumented democracy has positive effect on growth
- Holds with same robustness checks as in Table 3

Channels

Table 6: use alternative outcome variables instead of log GDP/capita