

How Institutions Cause Growth

The Proximate Channels

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The Research Question

"Average income levels in the world's richest and poorest nations differ by a factor of more than 100. What accounts for these differences and what (if anything) can reduce them? It is hard to think in economics of a question that is of greater intellectual significance, or of greater relevance to the vast majority of the world's population" - Dani Rodrik, 2004

The Research Question

What are the proximate channels through which institutional change causes economic growth?

- To what extent does institutional change impact total factor productivity (A) vs physical capital stock per capita (k) vs human capital stock (h)?
- How do these proximate factors change for a given change in the institutional environment?
- How does intra-regime institutional change impact the proximate factors?

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A Few Key Papers

- ① Acemoglu, D. et al. (2019). "Democracy Does Cause Growth", *Journal of Political Economy*, 127(1), pp. 47-100
- ② Acemoglu, D. and Robinson, K. (2008). "Persistence of Power, Elites, and Institutions", *American Economic Review*, 98(1), pp. 267-93
- ③ Hseigh, C. and Klenow, P. (2010). "Development Accounting", *American Economic Journal*, 2(1), pp. 207-223
- ④ Boese-Schlosser, V. and Eberhardt, M. (2023) "How Does Democracy Cause Growth?", *Berlin Social Science Center Discussion Papers*, 501
- ⑤ Funke, M et al. (2023) "Populist Leaders and the Economy", *American Economic Review* 113(12), pp. 3249-3288
- ⑥ ...and many more

Democracy Does Cause Growth - Acemoglu, 2019

Key Findings:

- **A country that transitions from nondemocracy to democracy achieves about 20 percent higher GDP per capita in the next 25 years than a country that remains a nondemocracy**
- The effect of democracy does not depend on the initial level of economic development
- Growth effects appear to be driven by greater investments in capital, schooling, and health

Democracy Does Cause Growth - Acemoglu, 2019

Empirical Strategies:

- i Dynamic panel model for GDP including country fixed-effects and autoregressive dynamics
- ii Democratization 'treatment' effect, modelling the selection of countries into democracy without specifying a parametric process for GDP
- iii Instrumental variable based on observation that democratization occurs in regional waves across countries with similar histories

Suggestions for Future Research:

- An exploration of interactions between political regimes and economic outcomes, incorporating nonlinear dynamics, multiple regime types, and heterogeneous effects

In *CEPR Discussion Paper No. DP13659*, Eberhardt observes that:

- Acemoglu's paper involves 2 implicit assumptions:
 - i Parameter homogeneity
 - ii Cross-section dependence

Arguments against parameter homogeneity:

- Threshold levels of economic or human development as necessary conditions for a positive democracy-growth nexus
- Differential growth trajectories by democratization scenario

Arguments against cross-section dependence:

- Global spillovers or shocks with heterogeneous impact across countries

Eberhardt drops countries on the basis of observation count and finds that the long-run estimates:

- become statistically insignificant when between 3% and 8% of the over 6,000 observations are dropped
- become economically near-insignificant (long-run estimates below 5% in magnitude) when between 14% and 28% of observations are dropped

Key Findings:

- **Acemoglu and Robinson's model implies the possibility of "captured democracy", whereby a democratic regime may survive but choose economic institutions favoring the elite**
- There may be greater inefficiency in democracy than in nondemocracy, as economic allocations may be similar but the elite chase de facto power in the former
- Limitations on the elite's ability to control politics need to be implemented simultaneously with democratization for economic benefits to materialise

Theoretical Argument:

- De jure power is not equal to de facto power
- De facto power is essential for the determination of economic policies and the distribution of economic resources
- De facto power is possessed by groups as a result of their wealth, weapons, or ability to solve the collective action problem
- A change in de jure power associated with an offsetting change in the distribution of de facto political power will not lead to a change in economic institutions
- Sometimes, the offset caused by elite's investments in de facto power will be full, so that equilibrium economic institutions are identical in democracy and nondemocracy ("invariance")

Key Findings:

- Cross-country income differences are explained by variance in:
 - A (TFP) (**50-70%**)
 - k (Physical capital) (**20%**)
 - h (Human capital) (**10-20%**)
- There are positive feedback effects between human capital, physical capital, and TFP
- The level of TFP in different sectors can influence the incentive to accumulate physical and human capital

Theoretical Framework (lifted from Caselli, 2004):
Hall and Jones Production:

$$Y = AK^{\alpha}(Lh)^{1-\alpha} \Rightarrow y = Ak^{\alpha}h^{1-\alpha}$$

where

$$K_t = I_t + (1 - \delta)K_{t-1}$$

$$h = e^{\phi(s)}$$

Suggestions for future research:

- Investigating how institutions and culture affect the accumulation of physical capital, human capital and TFP

How Does Democracy Cause Growth - B&E, 2023

Key Findings:

- In the long-run, liberal democracy has a permanent growth effect
- Clean elections, freedom of expression and legislative constraints on the executive drive economic prosperity in the long-run
- Initially strong positive effects of freedom of association, judicial constraints on the executive, and the rule of law peter out

Empirical Strategy:

- Principal-Component Difference-in-Differences based on Chan & Kwok, 2020

Suggestions for future research:

- The effect of marginal improvements in political institutions rather than just regime change

Key Findings:

- Over 15 years, GDP per capita and consumption decline by more than 10% compared to a plausible non-populist counterfactual
- The income distribution does not improve on average
- Significant decline in judiciary independence, election quality, and press and media freedom

Empirical Strategy:

- Construction of a synthetic counterfactual for each individual populist episode

Key Ideas From the Literature

- Democracy causes growth
- Not all democracies (nor all autocracies) are created equal - intra-regime heterogeneity matters
- Some democracies may exhibit traits and institutions closer to an autocracy - regime change alone is not a panacea
- It is unclear through which proximate channels institutional change causes growth
- Institutions matter for growth by affecting the incentives to innovate and the ability or incentive for agents to accumulate capital

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The Proximate Economy:

- Penn World Tables

The Institutional Environment:

- V-Dem Indices

V-Dem "Versions of Democracy"

Electoral: Captures extent to which rulers are responsive to citizens through periodic elections,

Liberal: Captures the value of protecting individual and minority rights against a potential "tyranny of the majority" and state repression

Participatory: Values active participation by citizens in all political processes, including non-electoral

Deliberative: Captures extent to which policy is informed by reason-based dialogue at all levels rather than coercion, parochial interests etc.

Egalitarian: Captures extent to which all groups enjoy equal de jure and de facto capabilities to political participation

Majoritarian: Captures whether the majority of the people must be capacitated to rule and implement their will

Consensual: Values minority participation and rights

- **Electoral Democracy Index**

- Freedom of expression and alternative sources of information
- Freedom of association
- Universality of suffrage
- Clean elections

- **Liberal Democracy Index**

- Electoral Democracy Index
- Judicial equality & liberty
- Judicial constraints on the executive
- Legislative constraints on the executive

- **Partipatory Democracy Index**

- **Deliberative Democracy index**

- **Egalitarian Democracy Index**

V-Dem: Regime Transformation Dataset

This dataset identifies episodes of regime change

- Democratization:
 - 1 Liberalizing Autocracy
 - 2 Democratic Deepening
- Autocratization:
 - 1 Democratic Regression
 - 2 Autocratic Regression

"The index will not give us a satisfying answer if we are interested in non-electoral understandings of democracy (or different understandings of electoral democracy); if we are also interested in the political systems of microstates; and only interested in big differences in the political systems of countries. In these cases, we will have to rely on other measures.

But if we value a sophisticated measure based on the knowledge of many country experts and **are interested in big and small differences in electoral democracy, within and across countries, and far into the past, we can learn a lot from this data.**"

- Herre, 2024

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Baseline Framework: Romer, 1990 and Jones, 1995

The theoretical framework will build on Jones' 1995 revisions to Romer's 1990 model of endogenous growth

- We build on Jones due to the original Romer model assuming unrealistic scale effects

Representative Household

- The total population of workers (L) supplies labour inelastically
- The representative household owns a balanced portfolio of all the firms in the economy

Representative Household (CRRA Preferences)

$$\max \int_0^{\infty} \exp(-(\rho - n)t) \frac{c(t)^{1-\theta} - 1}{1-\theta} dt$$

where

- n is the population growth rate
- ρ is the subjective discount rate
- θ is the inverse of the intertemporal elasticity of substitution

Production

- Some firms in this economy have monopoly power \Rightarrow the representative firm theorem no longer applies
- The unique final good is produced competitively

Final Good Production

$$\left(\frac{1}{1-\beta}\right) \int_0^{N(t)} x(v, t)^{1-\beta} dv \cdot L_E^\beta$$

where

- L_E is labour involved in final good production
- L_R is labour involved in R&D
- $N(t)$ is the number of machine varieties
- $x(v, t)$ is the total amount of variety v used at time t

Value of machine-variety producing monopolist:

Profits of Monopolist Producing Machine v at time t

$$\pi(v, t) \equiv p^x(v, t) \cdot x(v, t) - \psi \cdot x(v, t)$$

Net Present Discounted Value of Owning Machine Variety Blueprints

$$V(v, t) = \int_t^{\infty} \exp\left(-\int_t^s r(s') ds'\right) \pi(v, s) ds$$

where

- ψ is the marginal cost of production

Infinite Horizon Maximum Principle

Suppose that the problem of

$$\begin{aligned} \max W(x(t), y(t)) &\equiv \int_0^{\infty} f(t, x(t), y(t)) dt \\ \text{s.t.} \end{aligned}$$

$$\dot{x}(t) = g(t, x(t), y(t))$$

$$x(t) \in \mathcal{X}, y(t) \in \mathcal{Y}, x(0) = 0, \lim_{x \rightarrow \infty} b(t)x(t) \geq x$$

has a piecewise continuous interior solution $(\hat{x}(t), \hat{y}(t)) \in \text{Int } \mathcal{X} \times \mathcal{Y}$

Then, the **Hamiltonian**:

$$H(t, x(t), y(t), \lambda(t)) \equiv f(t, x(t), y(t)) + \lambda(t)g(t, x(t), y(t))$$

satisfies the **maximum principle**:

$$H(t, \hat{x}(t), \hat{y}(t), \lambda(t)) \geq H(t, \hat{x}(t), y(t), \lambda(t)) \quad \forall y \in \mathcal{Y}, \forall t \in \mathbb{R}$$

Infinite Horizon Maximum Principle (cont.)

Moreover, $\forall t \in \mathbb{R}_+$ for which $\hat{y}(t)$ is continuous, the following necessary conditions are satisfied:

$$H_y(t, \hat{x}(t), \hat{y}(t), \lambda(t)) = 0$$

$$-H_x(t, \hat{x}(t), \hat{y}(t), \lambda(t)) = \dot{\lambda}(t)$$

$$H_\lambda(t, \hat{x}(t), \hat{y}(t), \lambda(t)) = \dot{x}(t)$$

Hamilton-Jacobi-Bellman (HJB) Equation

Define the **value function** as:

$$V(t_0, x(t_0)) = \sup \int_{t_0}^{\infty} f(t, x(t), y(t)) dt$$

Suppose that the Infinite Horizon Maximum Principle holds. Then, when $V(t, x)$ is differentiable in both of its arguments, the optimal pair $(\hat{x}(t), \hat{y}(t))$ satisfies the **Hamilton-Jacobi-Bellman Equation**:

$$f(t, \hat{x}(t), \hat{y}(t)) + \left(\frac{\partial V(t, \hat{x}(t))}{\partial t} \right) + \left(\frac{\partial V(t, \hat{x}(t))}{\partial x} \right) \cdot g(t, \hat{x}(t), \hat{y}(t)) = 0 \quad \forall t \in \mathbb{R}$$

Alternative formulation of the monopolist's value function:

Assuming the value function is differentiable in t , we can write the following by employing the HJB equation:

Net Present Discounted Value of Owning Machine Variety Blueprints

$$r(t)V(v, t) - V(v, t) = \pi(v, t)$$

Flow Profits of Monopolists from Selling Machines

$$\pi(t) = \beta L_E(t)$$

Technological Progress in the R&D Sector

$$\dot{N}(t) = \eta N(t)^\phi L_R(t)$$

Where

- $\phi < 1$ (limited knowledge spillovers)
- η is a multiplicative parameter capturing how much $N(t)$ increases for a given increase in R&D spending

Noting that

Instantaneous Profits from Final Production

$$\max \left(\frac{1}{1-\beta} \right) \int_0^{N(t)} x(v, t)^{1-\beta} dv \cdot L_E^\beta - \int_0^{N(t)} p^x x(v, t) dv - L_E w(t)$$

yields (via first order conditions)

Demand for Machines from Final Good Sector

$$x(v, t) = p^x(v, t)^{\frac{-1}{\beta}} L_E$$

And noting that (via first order conditions of instantaneous profits from final production)

Equilibrium Wage Rate

$$w(t) = \frac{\beta}{1-\beta} N(t)$$

And observing that the Household's Maximization Problem yields Euler Equation for consumption:

$$\frac{\dot{c}(t)}{c(t)} = \frac{1}{\theta}(r(t) - \rho)$$

We can say that, provided the **steady-state rate of interest** $r > n$, that:

$$\eta N(t)^{\phi-1} \frac{(1-\beta)L_E(t)}{r^*-n} = 1$$

Differentiating this w.r.t. time yields:

$$(\phi - 1) \frac{\dot{N}(t)}{N(t)} + \frac{\dot{L}_E(t)}{L_E(t)} = 0$$

On the balanced growth path, population growth is constant and equal to n , and per-capita output, consumption and technology growth are all equal, yielding:

Balanced Growth Path Growth Rates

$$g_y^* = g_c^* = g_N^* = \frac{n}{1-\phi}$$

Building on Romer, 1990 and Jones, 1995

The task involves modelling the number of machine varieties available, and growth in the number of machine varieties, as a function of the inclusivity of the institutional environment.

We assume that, where I denotes increasing inclusivity of the institutional environment:

$$\frac{\partial N}{\partial I} > 0 \text{ and } \frac{\partial^2 N}{\partial I^2} < 0$$

$$\frac{\partial \dot{N}}{\partial I} > 0 \text{ and } \frac{\partial^2 \dot{N}}{\partial I^2} < 0$$

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Principle Component Difference in Differences

Goodman-Bacon (2021) prove using a decomposition theorem that a causal interpretation of twoway fixed effects DiD estimates requires both parallel trends and treatment effects that are constant over time, else estimates may be significantly biased

Chan and Kwok (2020) have developed a DiD estimator that can be applied to scenarios in which trends are potentially unparallel and stochastic among control and treated units

This **Principal Component Difference in Differences** framework has been employed by Eberhardt (2023, 2024) to test the causal impacts of democratization on growth, modelling regime change as a 2-stage process

Principle Component Difference in Differences

Episodes of institutional change (both intra-paradigm and regime change) will be analysed using an event-study employing the PCDiD estimators developed by Chan and Kwok

Regime change and intra-paradigm change will also be considered separately to analyse whether the impact of de jure changes (discontinuities) on the continuum that is de facto elite power

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- Extant literature finds positive causal relationship between democracy and growth, but does not isolate proximate channels nor considers intra-regime institutional change
- Institutions will be proxied using V-Dem data
- Will attempt to build on endogenous technological change models to fit institutions into a macroeconomic framework
- Principal Component Difference in Difference estimators allow running an event study with nonparallel trends