Evaluating Intrinsic Effects of Political Institutions

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May 20, 2018

Introduction

- Randomized experiments have revolutionized policy evaluation for the past 25 years (World Bank, J-PAL, IPA, 3iE).
- **Main goal:** Inferring causal effects of policy interventions.
- Effect of Treatment 1 (assigned textbooks) versus Treatment 0 (no textbooks) on variable Y (student performance).
- Effect of Treatment 1 (Programmatic/clientelist message) versus Treatment 0 (business as usual)

Introduction

Advantages include:

- Internal validity
- Rigorous assessment of well-defined policy alternatives
- Culture of evaluation that profoundly reshaped international development and political economy research

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Limitations:

- External validity
- Lack of rigorous analysis of the policy-making process
- Example: A Process such as policy deliberation can reveal valuable information about agentsâ preferences and motivations. Improve relevance and effectiveness,
  - Participation can affect payoffs through a sense of empowerment, ownership and legitimacy
  - But how to capture this formally, and empirically?

Introduction

What is an institution?

- A policy-making process (e.g. deliberation) can be considered an "institution" or game form (Gibbard, [1973], Myerson [1995] and Hurwitz, [1986], specifying only the set of players, the sets of strategies for each player, and an outcome function.
- Therefore, an institutional experiment should consist of a random assignment of specific game forms to groups of players with specific strategy sets, well defined mapping of strategies to payoffs.
- In a typical institutional experiment, treatments or the policy to be evaluated are an unknown outcome of a well specified process or strategic game.

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Examples:

- Community driven development projects: Public projects in which local communities have broad decision-making power.
- Fastest growing form of development assistance.
- Research projects on participation in governance (Casey et al [2011], Humphreys et al [2012], Olken [2008], Raffler, Posner and co-authors (2017) to name just a few).
- Evidence on the effectiveness of these projects are mixed results, at best.

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Why such inconclusive results?

- Lack of institutional specifics in the design of the experiments or the implicit assumption that are all forms of participation are equal.
- Institutional details matter, but often neglected: Participation with deliberation or no deliberation? With or without voting? Who sets the agenda? What is the agenda?
- Treatment heterogeneity: The game's implementation must be the same in every group that receives the treatment in order to consistently estimate its effect (e.g. duration of the town hall meeting).

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Two field experiments with explicit institutional details

1) Oklen (2010)

- 49 villages randomly assigned development projects by representative-based meetings or direct election-based plebiscites
- **Findings:** Direct participation in decision-making can increase satisfaction and legitimacy.
- Plebiscites are associated with higher satisfaction,increased knowledge about project, greater perceived benefits, and higher reported willingness to contribute
- Limitations:
  - Difference between total effect and "democracy" effect unclear
  - Policy outcomes not always the same in treatment and control groups.

Figure: Indonesian villagers participating in meetings. Source: JPAL

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2) Wantchekon et al (2014, 2016)

- Tested a voter engagement intervention in Benin and the Philippines: Party-endorsed town hall meetings where people deliberate over platforms proposed by candidates.

- Deliberation might outperform rallies because of its effect on attendees:
  - Why? Voter coordination. Platform transparency and customization. Acting information-sharing
  - Main Finding: Policy deliberation has positive effect on turnout and candidates' vote share. Effect runs mostly through information-sharing. network

- Major Limitation: No estimate of the intrinsic effect of deliberation

Figure: Town Hall Meetings in Benin

Figure: Policy Deliberation in the Philippines

Approach

A near perfect institutional experiment, but...in the lab (Dal Bo et al [2011])

- **Question:** Does the effect of a policy depend on whether it is imposed endogenously through a democratic process or exogenously?
- **Design:** Subjects choose by simple majority to establish a policy that could encourage cooperation by including a fine for unilateral defection. In certain cases, the software overrides the subjects' vote and randomly imposes or doesn't impose the policy (Subjects informed of whether this takes place before the game's subsequent round).
- **Main results:** Policy's effect on the percentage of cooperative actions is significantly greater when democratically chosen.
- **Limitation:** What is the mechanism driving this "democratic premium" ?

Our Approach

- Adopt the exogenous control institution and majority rule treatment approach from Dal Bo et al. (2011)
- Use insights from the principal agent approach by Chassang et al. (2011)
- Use a simple theoretical model to show how voting can change agentsâ beliefs over policy alternatives. This belief update generates an institution-induced (intrinsic) effect.

Our Approach

- We show that the potential outcome of a policy under a given institution can be obtained as the sum of a component driven by the initial belief toward the policy and another component driven by the differential effort toward outcomes generated by belief updating.
- We propose a practical statistical approach for estimating the intrinsic causal effect the institutions, and show that our estimator has desirable statistical properties

Findings - Theory

- Collective choice (e.g. majority vote) reveals information about people's private preferences, which allows individuals to update their beliefs about the treatments (in favor to the majority choice).

- The intrinsic effect of the institution is the difference between the outcome of the community that collectively chooses its treatment and a similar community to whom this same treatment is imposed.

  $\rightarrow$ This intrinsic effect is driven by the additional effort towards outcome generated by belief updates.

- Develop a statistical device to estimate this effect.

Findings - Empirics

- Develop a statistical device to estimate this effect.
- Consistently estimates institutional treatment effects by modeling explicitly individual choices in the treatment groups.

  $\rightarrow$ Match treatment groups with similar propensity scores and different policy outcomes.

  $\rightarrow$ Then, assuming that policy selection is conditional only on observed covariates, derive the institutional effect.

Key steps in conducting Institutional Experiments

- Design an exogenous, control Institution.
- Ensure Institutional Treatment Homogeneity (game form and implementation).
- Measure individual beliefs over the policy alternatives prior to the vote or deliberation. Through a survey?
- Measure the policy outcome (D) resulting from the majority vote.
- Capture individual beliefs over the policy outcome D
- Use Propensity score matching to estimate the probability of D being selected, given the covariates,

Model Description

- Suppose a random sample of K communities, $k = 1, 2, \ldots, K$, from the population of interest.
- Purpose: Estimate the effect of an L-valued treatment or policy $\mathcal{D} = \{1, 2, \ldots, L\}$ on an outcome of interest Y.
- Community k is randomized into one of the two institutions $Z_k \in \{0, 1\}$:

  $\rightarrow$ If $Z_k = 0$, then k is randomly assigned (imposed) treatment from $\mathcal{D} = \{1, 2, \ldots, L\}$ (Institution 0)

  $\rightarrow$ If $Z_k = 1$, then k is allowed to freely choose their own treatment from $\mathcal{D}$ through a collective decision-making process such as voting, deliberation, etc. (Institution 1).

Model Description

- The potential outcome for community k is $Y_k(z, d) \in \mathcal{Y}$, where $z \in \{0, 1\}$ and $d \in \mathcal{D}$.
  The realized outcome of community k is therefore

$$Y_k = Y_k(Z_k, D_k) = \sum_{z \in \{0,1\}} \sum_{d \in \mathcal{C}} Y_k(z, d) \mathbf{1}\{Z_k = z\} \mathbf{1}\{D_k = d\} \tag{1}$$

- We therefore depart from mediation analysis of Knox, Yamamoto, Baum & Berinsky (2017):

  $\rightarrow$ We rule-out the so-called exclusion restriction, since a nominally identical treatment may have different effects on the same community depending on Z.

Initial Beliefs

- Assume each individual values treatments according to their belief or type, $t \in \mathcal{D} = \{1, 2, \ldots, L\}$ for simplicity (e.g. single-peaked preferences).
- Initial belief t^0 (that is, belief prior to random assignment to institutions) of a randomly selected individual about the menu of treatments $\mathcal{D}$ is such that

$$\sum_{d \in \mathcal{D}} \Pr[t^0 = d] = 1. \tag{2}$$

- This may translate onto their expected returns about the treatments, see Chassang, Padro i Miquel & Snowberg (2012) (e.g., preferred treatment is expected to yield relatively higher returns).

Beliefs under Institution 0

- Individuals in the community assigned to Institution 0 (under the imposed treatment A) do not update their beliefs ex-post, i.e.

$$\Pr[t = d | Z = 0, A] = \Pr[t^0 = d], \quad \forall d, A \in \mathcal{D}. \tag{3}$$

- However, individuals in the community assigned to Institution 1 may update their beliefs after private information has been aggregated through vote. See Feddersen & Pesendorfer (1997), Chan, Lizzeri, Suen & Yariv (2017)

Beliefs Under Institution 1

In other words, when the community collectively chooses D, then:

- The probability of believing in another treatment d given the (observed) majority treatment D may decrease by some q_d^D, i.e.:

$$\Pr[t = d|Z = 1, D] = \Pr[t^0 = d] - q_d^D, \qquad \forall d \neq D \tag{4}$$

- Hence the probability of believing in the (observed) majority treatment D may increase by $\sum_{l \neq D} q_l^D$:

$$\Pr[t = D|Z = 1, D] = \Pr[t^0 = D] + \sum_{l \neq D} q_l^D \tag{5}$$

Beliefs and efforts towards outcome

We assume that

- For any implemented treatment $A \in \{1, \ldots, L\}$, individuals with belief t exert effort $e_t(Z, A) \in \{0, 1\}$ towards the outcome, such that

$$e_t(Z, A) = \begin{cases} 1 & \text{if } t = A \\ 0 & \text{if } t \neq A \end{cases}$$

  That is, agents exert maximum effort only on the project they believe in or voted for, and exert no effort otherwise.

- This assumption can be endogenized using a simple stylized example of linear expected utility in effort from Chassang, Padro i Miquel & Snowberg (2012).

Beliefs and efforts towards outcome

From Chassang, Padro i Miquel & Snowberg (2012)

- Expected utility function for the individual can be written as a linear function of the expected return R_t and a constant cost c associated with effort.

  Suppose individual outcome is $y = y_0 + Re_t$ when treated. R is the (unknown *a priori*) return of the policy. If the cost of effort is c, then expected utility is

  $$U_t(y, e_t) = E[y|t] - ce_t = E_t[y_0 + Re_t] - ce_t = y_0 + (R_t - c)e_t$$

- The individual believes in the project for which $R_t - c > 0$ and will therefore maximize his or her expected utility for those projects by choosing $e_t = 1$.
- However, for the projects the individual does not believe i.e. $R_t - c < 0$, utility maximization implies $e_t = 0$.

Efforts and outcome

- Let $Y(Z, d)$ be the potential outcome we would observe on an individual had her community assigned Z and treatment d.

$$\begin{aligned} Y(Z, d) &= y_0 + \mathbf{E}[Re_t(Z, A)|Z, A = d] \\ &= y_0 + R \Pr[t = A|Z, A = d] \end{aligned} \tag{6}$$

- Then, for $Z = 0$,

$$Y(0, d) = y_0 + R \Pr[t^0 = d], \quad d \in \mathcal{D}$$

- While for $Z = 1$, we have $d = D$ so that

$$Y(1, D) = y_0 + R \left(\Pr[t^0 = D] + \sum_{l \neq D} q_l^D \right)$$

Efforts and outcome

- We then have the following result:

Proposition

The potential outcome of a community assigned to Institution Z under Treatment D can be written as

$$\begin{aligned} Y(Z,D) &= Y(0,D)(1-Z) + Y(1,D)Z \\ &= y_0 + R\Pr[t^0 = D] + \left(R\sum_{I \neq D} q_I^D\right) Z \end{aligned} \tag{7}$$

Quantities of interest

- **The average institution effect** is defined by

$$\tau_{0,1} = \mathbf{E}[Y(1,d) - Y(0,d)] \tag{8}$$

This is the average effect that the decision-making process can have on the outcome Y
$\rightarrow$ This is similar to the "Total Effect" of democracy computed by Dal Bó, Foster & Putterman 2010.

- We define **the intrinsic effect of Institution 1** (compared to Institution 0) **under treatment** D by:

$$\tau_{0,1}(D) = \mathbf{E}[Y(1,d) - Y(0,d)|d = D] = R \sum_{d \neq D} q_d^D \tag{9}$$

Empirics

- Consider a community with n individuals.

  Let $\vec{Y}(z,d) = (Y_1(z,d), \ldots, Y_n(z,d))$ be the vector of counterfactual outcome variables under Institution z and Policy d.

- Denote $\vec{X} = (X_1, \ldots, X_n)$ vector of community covariates, where $X_i \in \mathcal{X}$ is a vector of covariates for individual i.

Randomization

- We make the following assumption:

Assumption (Randomization of institutions)

Conditional on $\vec{X}$, $\{\vec{Y}(1,d),\ \vec{Y}(0,d),\ D\}$ *is independent to* Z, *for all* $d \in \mathcal{D}$.

- Under this assumption, the average institution effect

$$\tau_{0,1} = \mathbf{E}[Y(1,d) - Y(0,d)]$$

can be estimated from the design by comparing the average outcome over the communities under Institution 1 and the communities under Institution 0.

Ignorability

- But the intrinsic effect of Institution 1 under treatment D cannot be estimated without further assumptions.

Assumption (Strong Ignorability)

$\{\vec{Y}(1,d)\}$ and D are conditionally independent given $\vec{X}$, for all $d \in \mathcal{D}$.

- This is the strong ignorability assumption of Rubin & Rosenbaum (1983).
  Notice that

$$\mathbb{E}\left[\vec{Y}(1,D)|\vec{X}\right] = \frac{\mathbb{E}\left[\vec{Y}(1,d)\mathbf{1}\{d=D\}|\vec{X}\right]}{\Pr\left(d=D|\vec{X}\right)},$$

  provided the denominator is nonzero.

Estimation

- Under the above assumptions the intrinsic treatment effect, $\tau_{0,1}(D)$ can be estimated, if the propensity score $\Pr\left(d = D|\vec{X}\right)$ is given.
- In practice, $\Pr\left(d = D|\vec{X}\right)$ is rarely known and needs to be estimated.
- Assuming that policy selection is conditional only on observed covariates, compute the policy effect using propensity score.

  $\rightarrow$ This treatment probability may be estimated via a structural econometric approach by specifying utilities over communities.

Estimation

- Suppose also that we have K communities indexed with k from 1 to K and that community k has n_k individuals.
- Denote $Y_{k,i}(0,d)$ (resp. $Y_{k,i}(1,d)$ the counterfactual outcome of individual i in community k if that community is assigned to Institution 0 and Policy d (resp. Institution 1 and Policy d).
- For the k th community, we observe Z_k and D_k. Hence for the i th individual in the k th community, we observe $Y_{k,i}$ defined by:

$$Y_{k,i} = \sum_{d=0}^{L} Y_{k,i}(1,d)Z_k + Y_{k,i}(0,d)(1-Z_k)$$

Estimation

- Denote $\hat{p}(\vec{X})$ the estimator of $\Pr\left(d = D|\vec{X}\right)$. We introduce the estimator:

$$\widehat{\tau}_{0,1}(D) = \frac{\sum_{k=1}^{K} \hat{p}(\vec{X})^{-1} Z_k \mathbf{1}_{(D_k=D)} \bar{Y}_k}{\sum_{k=1}^{K} Z_k} - \frac{\sum_{k=1}^{K} \hat{p}(\vec{X})^{-1} (1 - Z_k) \mathbf{1}_{(D_k=D)} \bar{Y}_k}{\sum_{k=1}^{K} (1 - Z_k)}$$

  where $\bar{Y}_k = n_k^{-1} \sum_{i=1}^{n_k} Y_{k,i}$.

- We have the following result

Proposition

Assume $\Pr\left(d = D|\vec{X}\right) > 0$. *Then*

(i) $\widehat{\tau}_{0,1}(D)$ *converges in probability to the intrinsic institutional effect* $\tau_{0,1}(D)$ *under policy* D *as* $K \to \infty$.

(ii) There exists $\sigma^2 > 0$ *such that*

$$\sqrt{K}(\widehat{\tau}_{0,1} - \tau_{0,1}) \xrightarrow{d} N(0, \sigma^2), \quad as \quad K \to \infty$$

Conclusion

- Developed a model to explain how the intrinsic effect of an institution can be identified by random assignment of communities to alternative institutions.
- Defined conditions that are required to estimate the average institution effect and the intrinsic effect of a collectively chosen policy.
- Key remaining steps: formalize the effect of the collective decision-making process on beliefs, and estimate the probability of this collective decision.

  $\rightarrow$ useful to empirically identify the intrinsic effect.