Revealed Political Power

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Introduction

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- The principle is used to judge a government's legitimacy.
- ... embodied in rhetoric.

  "one-man-one-vote", "justice is blind", "equality in the eyes of the law" - Cleisthenes, 508BC, etc.,...

Wealth Bias?

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  - **Political Knowledge and Contact**. Bartels (2008).
  - **Campaign contributions**. Austen-Smith (1987), Grossman and Helpman (1996), Prat (2002), Coate (2004), Campante (2008).

Research Agenda

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  - When can wealth bias be inferred?
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- **Our Focus: Identify Wealth Bias from Policy Outcome**:
  - When can wealth bias be inferred?
  - How much wealth bias can be inferred?
- **Methodology**:

  Non-parametric approach from Revealed Preference Tradition
- **Contrast with Existing Literature**:
  - *Implication from Parametric Models:*

    Benabou (2000), Campante (2008), Bai & Lagunoff (2010)
  - *Reduced Form Statistical Analysis:* Bartels (2008)

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3. Contracted Set of Allowed Preference. Add Preference Restrictions: supermodularity and "weakly separable utility"

   Result: unbiased polity imposes monotonicity restriction on the data.

The Economic Side

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Assumptions: One dimensional policies, states. Each state is distinct. **y** increasing in **i**, and its structure is known/observed by outside observer.

Preferences

$\mathbf{U(i, \omega_t, a_t)}$ $=$ $\mathbf{i}$'s payoff fnct. Outside observer does not know/observe **U** directly, but knows that **U** belongs to an "admissible" class defined by

(A1) (Single peakedness) **U** single peaked in **a**.

(A2) (Single Crossing) **U** satisfies single crossing in $\mathbf{(a; i)}$.

A Static Example

$$u(c_t, G_t) = c_t + \frac{G_t^{1-\rho}}{1-\rho} \quad \text{s.t.}$$

$$c_t = (1-\tau_t)\, y\,(i, \omega_t)\,,$$

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Power is measured by a *wealth-weighted vote share* $\boldsymbol{\lambda}\left(\mathbf{y}, \boldsymbol{\alpha}, \boldsymbol{\omega}\right)$ where $\boldsymbol{\alpha}(\boldsymbol{\omega}) \;=\;$ *bias* in each state.

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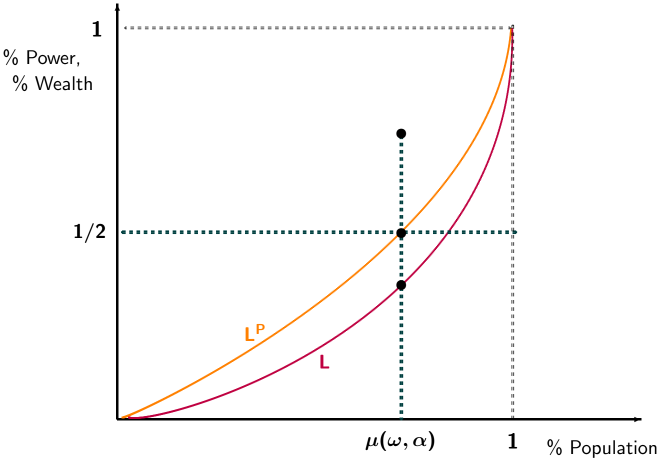
$1 - \alpha(\omega) = $ weight attached to *equal representation*.

$\alpha(\omega) > 0$ *an elitist bias*
$\alpha(\omega) < 0$ *a populist bias*
$\alpha(\omega) = 0$ *an unbiased polity*.

Political Lorenz Curve with Elitist Bias



Weighted Majority Winners

Def'n A policy **a** is an α-*Weighted Majority Winner (WMW)* in state ω under admissible profile **U** if,

$$\int_{\{\mathbf{i}:\ \mathbf{U}(\mathbf{i},\omega,\mathbf{a})\geq \mathbf{U}(\mathbf{i},\omega,\hat{\mathbf{a}})\}} \boldsymbol{\lambda}\left(\mathbf{y}(\mathbf{i},\omega),\alpha(\omega),\omega\right)\ \mathbf{di} \quad \geq \ \mathbf{1/2} \quad \forall\ \hat{\mathbf{a}}$$

Rationalizing Policy Data

Policy rule $\boldsymbol{\Psi}(\omega) \;=\; \mathbf{a}$.

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Def'n A weighting function α *rationalizes the policy data* $\{\mathbf{a_t}\}_{\mathbf{t=1}}^{\mathbf{T}}$ if $\exists$ admissible profile $\mathbf{U}$ and policy rule $\boldsymbol{\Psi}$ consistent with the data such that for each ω, $\boldsymbol{\Psi(\omega)}$ is an α-Weighted Majority Winner under $\mathbf{U}$.

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"Anything Goes" Theorem

Let $\{\mathbf{a_t}\}_{\mathbf{t=1}}^{\mathbf{T}}$ *be any policy data and* α *be any weighting function. Then* α *rationalizes* $\{\mathbf{a_t}\}_{\mathbf{t=1}}^{\mathbf{T}}$*.*

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Bottom line: any distribution of political power - including one implied by equal representation (an unbiased polity) - can rationalize the policy data.

- Prf is constructive. Apply Gans-Smart Med. Voter Thm. Then construct admissible preference profile (adapt Boldrin-Montruccio quadratic form).

$$\mathbf{U}\left(\mathbf{i}, \omega, \mathbf{a}; \mathbf{\Psi}\right) = -\frac{1}{2}\left(\mathbf{a} - \widetilde{\mathbf{\Psi}}\left(\mathbf{i}, \omega\right)\right)^{2},$$

where $\widetilde{\mathbf{\Psi}}(\mu(\omega, \alpha), \omega) = \mathbf{\Psi}(\omega)$.

Polling Data

- $\mathbf{N}$ polls taken at each $\mathbf{t}$ comparing $\mathbf{a_t}$ to policy alternatives

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- No measurement error (!!).

Def'n An α *rationalizes both policy data* $\{\mathbf{a_t}\}_{\mathbf{t=1}}^{\mathbf{T}}$ *and poll data* $\{\mathbf{p_t^n}\}_{\mathbf{t=1,n=1}}^{\mathbf{T,N}}$ if $\exists$ admissible $\mathbf{U}$ and $\mathbf{\Psi}$ consistent with the data such that

(i) $\forall\ \omega$, $\mathbf{\Psi}(\omega)$ is an α-Weighted Majority Winner under $\mathbf{U}$, and

(ii) $\forall\ \mathbf{t}\ \ \forall\ \mathbf{n}$, $\mathbf{U}$ satisfies

$$\mathbf{p_t^n} \ = \ |\{\mathbf{i}: \ \mathbf{U}(\mathbf{i}, \omega_\mathbf{t}, \mathbf{a_t}) \geq \mathbf{U}(\mathbf{i}, \omega_\mathbf{t}, \mathbf{a^n})\}|$$

Polling Result

Let $\mathbf{n_t^*}$ satisfy $\mathbf{a^{n_t^*-1}} < \mathbf{a_t} < \mathbf{a^{n_t^*}}$

$\mathbf{a^{n_t^*-1}}$ = closest "left-wing" alternative.
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Theorem

Let $\{\mathbf{a_t}\}$ be any policy data and $\{\mathbf{p_t^n}\}_{\mathbf{t=1,n=1}}^{\mathbf{T,N}}$ any arbitrary polling data. Then:

1. There exists an α that rationalizes the data iff $\forall$ $\mathbf{t}$,

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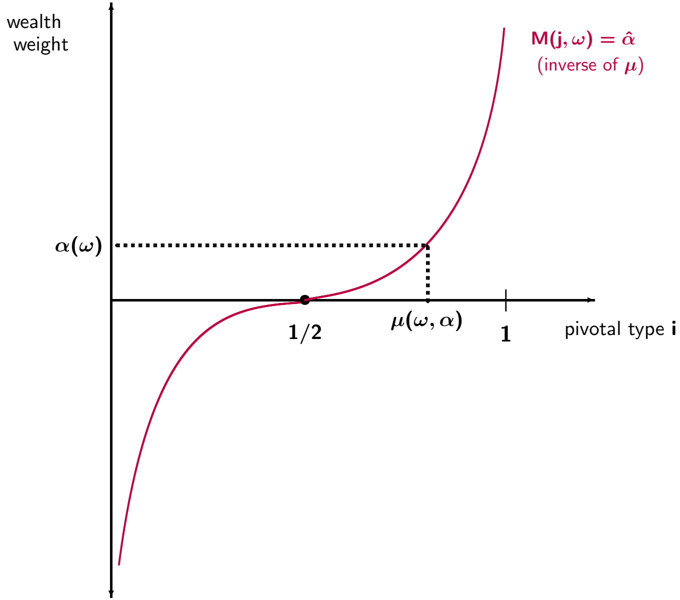
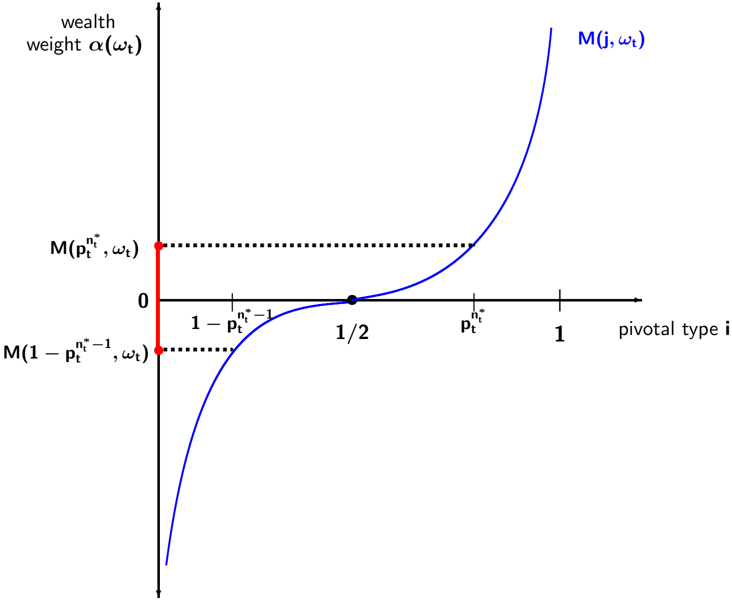
$\Rightarrow$ bias restriction

Inverse Pivotal Function $\mathbf{M}$



Bias Band


wealth
weight $\alpha(\omega_t)$
$M(j, \omega_t)$
$M(p_t^{n_t^*}, \omega_t)$
0
$M(1 - p_t^{n_t^*-1}, \omega_t)$
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1
pivotal type i

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- These narrower class of preference may help reveal political wealth bias
- We illustrate this from two canonical examples:
  - ω introduces a change in mean income
  - ω introduces a mean-preserving change of income inequality

Additional Preference Restrictions

Recall our canonical example of public goods provision

$$\mathbf{U}\left(\mathbf{i}, \omega_{\mathbf{t}}, \mathbf{a}_{\mathbf{t}}\right) = \mathbf{a}_{\mathbf{t}} \mathbf{y}\left(\mathbf{i}, \omega_{\mathbf{t}}\right) + \frac{\left[\left(1 - \mathbf{a}_{\mathbf{t}}\right) \bar{\mathbf{y}}\left(\omega_{\mathbf{t}}\right)\right]^{1-\rho}}{1-\rho}.$$

Two interesting cases:

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(b) pure (mean-preserving) inequality change. $\bar{\mathbf{y}}(\omega)=\bar{\mathbf{y}}$.

The preference only depends on $\mathbf{y}(\mathbf{i},\omega)$ and $\mathbf{a}$, i.e.,

$$\mathbf{U}(\mathbf{i},\omega,\mathbf{a})=\mathbf{u}(\mathbf{y}(\mathbf{i},\omega),\mathbf{a})$$

Additional Single-Crossing Preference Restrictions

(A3) $\mathbf{U}$ satisfies single crossing in the pair $(\mathbf{a}; \omega)$ for each $\mathbf{i}$.

$\Longrightarrow$ each citizen's preferred policy rule is incr. in the state.

Theorem

A weighting function α rationalizes $\{\mathbf{a_t}\}$ with preference in (A1)-(A3) iff for any pair of observed states such that $\boldsymbol{\omega_t} > \boldsymbol{\omega_\tau}$,

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Corollary

The unbiased weighting system rationalizes the policy data only if the data is wkly increasing in the state.

Additional Separable Preference Restrictions

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Corollary

The unbiased weighting system rationalizes the policy data iff a policy change is associated with a change of the median income in the same direction.

Conclusions

1. Toward a formal theory of revealed political power.
2. Policy data alone with only weak preference requirement is not discerning.
3. Policy + polling data jointly describe the boundaries of wealth bias.
4. Additional preference restrictions rule out some types of bias.
5. Biggest challenge: Multi-dimensional policy and state spaces. Some success with order restricted preferences, but inherent difficulties.

Single Crossing in $\mathbf{(i, a)}$:

For all $\mathbf{a} > \mathbf{\hat{a}}$,

$$\mathbf{U(i, \omega_t, a) - U(i, \omega_t, \hat{a}) \ > \ 0}$$

implies

$$\mathbf{U(j, \omega_t, a) - U(j, \omega_t, \hat{a}) \ > \ 0 \ \ \forall j > i.}$$

Two Interpretations

1. A Classic Static RPT Interpretation

The observer sees $\{\mathbf{a_t}, \boldsymbol{\omega_t}\}_{\mathbf{t=1}}^{\mathbf{T}}$. No intertemporal connection. Data is a time series generated by myopic citizens.

Two Interpretations

1. A Classic Static RPT Interpretation

The observer sees $\{a_t, \omega_t\}_{t=1}^T$. No intertemporal connection. Data is a time series generated by myopic citizens.

2. A Dynamic Economy Interpretation

The observer sees $\{a_t, \omega_t\}_{t=1}^T$. He infers intertemporal connections, backing out transition rule $\omega_{t+1} = Q(\omega_t, a_t)$. Data is generated by forward looking citizens (U is a long run payoff). Underlying time horizon is infinite.

The Political Side

Power is measured by a *wealth-weighted vote share* $\boldsymbol{\lambda}\left(\mathbf{y}, \boldsymbol{\alpha}, \boldsymbol{\omega}\right)$ where $\boldsymbol{\alpha}(\boldsymbol{\omega}) \;=\;$ *bias* in each state.

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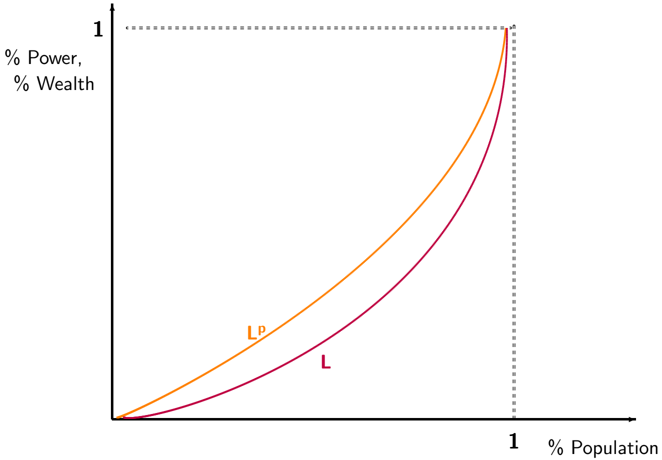
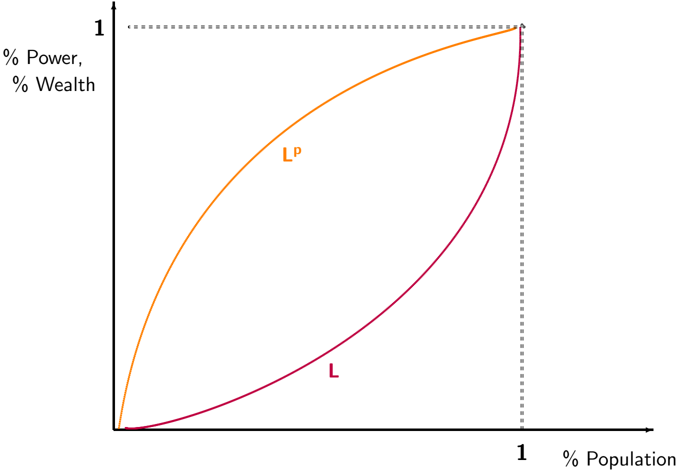
- $\boldsymbol{\lambda}$ is a density in income $\mathbf{y}$.
- $\boldsymbol{\lambda}$ is increasing in income if $\boldsymbol{\alpha} > \mathbf{0}$, decreasing in income if $\boldsymbol{\alpha} < \mathbf{0}$; constant if $\boldsymbol{\alpha} = \mathbf{0}$.
- $\boldsymbol{\lambda}$ satisfies strict single crossing in $(\boldsymbol{\alpha}; \mathbf{y})$ and $\rightarrow \mathbf{0}$ as $\boldsymbol{\alpha} \rightarrow \pm\infty$

Observer knows $\boldsymbol{\lambda}(\cdot)$ but must infer $\boldsymbol{\alpha}(\cdot)$ from data.

Political Lorenz Curve with Dampened Elitist Bias



Political Lorenz Curve with Populist Bias



Algorithm

Necessity is the easy part. Sufficiency is harder.

Step 1° Use a recursive algorithm to construct $\tilde{\boldsymbol{\Psi}}(\mathbf{i}, \omega)$ satisfying

1. $\tilde{\boldsymbol{\Psi}}(\mu(\omega_t, \alpha), \omega_t) \;=\; \mathbf{a}_t \quad \forall \mathbf{t} = 1, \ldots, \mathbf{T}$.
2. $\tilde{\boldsymbol{\Psi}}(\mathbf{i}, \omega)$ increasing in $\mathbf{i}$ and ω.

Step 2° Use the constructed $\tilde{\boldsymbol{\Psi}}$ to define $\boldsymbol{\Psi}$ and $\mathbf{U}$ given by

$$\mathbf{U}(\mathbf{i}, \omega, \mathbf{a}; \boldsymbol{\Psi}) = -\frac{1}{2}\left(\mathbf{a} - \widetilde{\boldsymbol{\Psi}}(\mathbf{i}, \omega)\right)^2,$$