An Experimental Investigation of Malapportionment in Bicameral Legislatures

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Malapportionment of Voting Power

▶ Voting power of each member not proportional to the population she represents.

▶ Examples:
  ▶ Bicameralism:
    ▶ US Congress: One legislator every 230,000 Alaskans and 660,000 Californians.

▶ Unicameral Weighted Voting:
  ▶ Council of the EU: One vote every 140,000 Maltese and 2.2 million Italians.
Proposal Power and Allocation of Resources

- Bicameralism and Unicameral Weighted Voting: Voting Power is Malapportioned.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Proposal Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicameralism</td>
<td>Properly Apportioned</td>
</tr>
<tr>
<td>Weighted Voting</td>
<td>Equality</td>
</tr>
<tr>
<td></td>
<td>Inequality</td>
</tr>
</tbody>
</table>

- Experimental Test of theory.
Proposal Power and Bicameralism

An Experimental Investigation of Malapportionment in Bicameral Legislatures
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Proposal Power and Weighted Voting

Malapportioned = Properly Apportioned

Allocations per capita vs Population
Outline of the Presentation

▶ Theory:
  ▶ Bicameralism: Ansolabehere, Snyder and Ting (APSR 2003)
  ▶ Weighted Voting: Extension to Snyder, Ting and Ansolabehere (AER 2005)

▶ Experiments:
  ▶ Bicameralism.
  ▶ Weighted Voting (Preliminary).
Theory: Bicameralism

- House and Senate allocate a fixed Budget to districts.

- Proposer: One legislator chosen to submit a Proposal.

- House and Senate approve a division by majority rule.

- Preferences of Representatives and Senators are connected.
Bicameralism: Example
Bicameralism: Proposal power and allocations

Proposal power

- Properly apportioned (in the House): 1/5 for each representative.
- Malapportioned (in the Senate): 1/3 for each senator.

MAIN STATEMENT (AST 2003):

- Proposal power properly apportioned, then equality.
- Proposal power malapportioned, then inequality.
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Theory: Weighted Voting

- Unicameral setting with one legislator per state.

- The legislator of state $t$ has $w_t$ votes and $z_t$ voters.

- $W$: total number of votes, $Z$: total population.

- Simple majority of votes for a proposal to pass.

- Malapportionment:
  - There is a $t$ such that $\frac{w_t}{W} < \frac{z_t}{Z}$.
Weighted Voting: Proposal power and allocations

- Proposal power ($p_t$)
  - Properly apportioned: $p_t = z_t/Z$.
  - Malapportioned: $p_t = w_t/W$.

- **MAIN STATEMENT:**
  - Proposal power properly apportioned, then inequality.
  - Proposal power malapportioned, then inequality. (STA 2005)

- Continuation value: $v_t = w_t/W$
Experimental Design: Bicameralism

- Run at CESS Lab (NYU).

- Treatments (Between subjects design):
  - House treatment: proposal power in the House.
  - Senate treatment: proposal power in the Senate.

- Legislatures of size 8: As in example.
- Allocate 50 dollars among 5 zones.
- 15 Rounds, 16 subjects per session.
- 3 Sessions per treatment (96 Subjects).
- Payment: One random round. Average pay 25 dollars.
Results: Malapportionment

- Continuation Values

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Weighted Voting: Experimental Design

- **Country:**
  - \( z_2 = 3 \)
  - \( w_2 = 2 \)
  - \( z_1 = 1 \)
  - \( w_1 = 1 \)

- \( Z = 10 \)
- \( W = 8 \)
- Number of Legislators = 6
Weighted Voting: Experimental Design

<table>
<thead>
<tr>
<th>Proposal Power</th>
<th>Small State</th>
<th>Big State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$p_1$</td>
<td>$q_1$</td>
</tr>
<tr>
<td>Super Malapportioned</td>
<td>16.7%</td>
<td>40.0%</td>
</tr>
<tr>
<td>Malapportioned</td>
<td>12.5%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Properly Apportioned</td>
<td>10.0%</td>
<td>66.7%</td>
</tr>
</tbody>
</table>

- **Treatments (Between Subjects Design):**
  - Super Malapportioned (2 Session)
  - Malapportioned (2 Session)
  - Properly Apportioned (0 Sessions)
- 12 subjects per session. (24 subjects per treatment)
- 15 Rounds.
Results: Probability of Joining the Coalition (preliminary)

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<th>Big State</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$p_1$</td>
<td>$q_1$</td>
<td>$p_2$</td>
<td>$q_2$</td>
</tr>
<tr>
<td>Super Malapportioned</td>
<td>16.7%</td>
<td>40.0%</td>
<td>16.7%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Observed</td>
<td></td>
<td>32.6%</td>
<td></td>
<td>77.4%</td>
</tr>
<tr>
<td>Malapportioned</td>
<td>12.5%</td>
<td>57.1%</td>
<td>25.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Observed</td>
<td></td>
<td>43.2%</td>
<td></td>
<td>66.3%</td>
</tr>
<tr>
<td>Properly Apportioned</td>
<td>10.0%</td>
<td>66.7%</td>
<td>30.0%</td>
<td>35.7%</td>
</tr>
</tbody>
</table>
Summary: Malapportionment

- **Bicameralism:**
  - No Small State Advantage when Proposer is chosen among Representatives.
  - Significant Small State Advantage when Proposer is chosen among Senators.

- **Weighted Voting:**
  - Small state advantage regardless of proposal power.
Bicameralism: Intuition

- MWC in House $\Leftrightarrow$ MWC in Senate.

- Proposal power in House: No district has an advantage.
- Proposal power in Senate: Small state districts have an advantage.
Weighted Voting: Intuition

- In SSSPE for $p_t = z_t/Z$ or $p_t = w_t/W$ continuation value is the same:
  - $v_t = \frac{w_t}{W}$.

- How can this be sustained?
  - $V_t$: Amount paid to other coalition members.
    - If $v_t$ is the same, $V_t$ is also the same.
  - $q_t$: Prob. of being in coalition given not the proposer.

- Continuation value:
  - $v_t = p_t(1 - V_t) + (1 - p_t)q_t v_t$.
  - $q_t = \frac{v_t - p_t(1 - V_t)}{1 - p_t}$