Should Voting be Anonymous in Legislatures?

Economics and Politics Research Group Seminar
Universidade de Brasília - Oct. 14, 2015.

Rogério Mazali
Catholic U. of Brasília
Dept. of Economics

José A. Rodrigues-Neto
Australian National U.
School of Economics

12/02/2015

Should Voting be Anonymous in Legislatures?

- Most of the voting in Legislatures (in most countries) is open.
- Anonymous voting in a few cases:
  1. sensitive issues
  2. decisions regarding internal procedures
  3. internal regiments
- In some countries (like Brazil), most of the voting is anonymous, but sensitive issues have open voting.
- Anonymous voting: voters are free from pressure
- Open voting: transparency
- When should voting be open or closed?

Voting

- There are two projects; one will be selected by simple majority:
  - P^a efficient (**good**) project;
  - P^b inefficient (**bad**) project.
- $2n-1$ voters, indexed by $j \in J = \{1, 2, \cdots, 2n-1\}$
- Mandatory voting $\Rightarrow$ no ties, there is always a winner project.

Utility of Voters

- Voters get utility from three (separable) sources: direct, reputation, monetary.
- Utility of voter $j \in J = \{1, \cdots, n, \cdots, 2n-1\}$ is:

$$u_j(P_j) = u_j^D(P_j) + u_j^R(P_j) + u_j^B(P_j)$$

- Let $\beta > 0$ be relative importance of direct utility component;
- Let $h > 0$ be a parameter that represents the house preference over projects A and B.

Direct Utility

- **Direct benefit** of efficient project P^a:

$$u_j^D(P^a) = \left(-1 + \frac{j}{h}\right)\beta$$

- Obs.:

$$u_j^D(P^a) > 0 = u_j^D(P^b) \qquad \Leftrightarrow \qquad j > h$$

- Assume $n > h$, so median voter ($j = n$) prefers project P^a to P^b.

Indirect Utility: Reputation and Bribes

- **Reputation:**

If it becomes public that j voted for P^b, then $u_j^R(P_j) = -R < 0$
Otherwise, $u_j^R(P_j) = 0$
$R =$ cost of losing her reputation because she was observed voting for project P^b

- **Bribes:**

$u_j^B(P_j) = B_j$, the bribe payment received by j (may be zero)

Constitution Maker (CM)

- **Constitution Maker (CM):**
- Chooses a voting rule: open or anonymous voting;
- Acts like a Benevolent Social Planner;
- Maximizes the probability that project P^a wins.

Lobbyist

- Tries to induce project P^b to be approved, lobbyist is not financially constrained. Lobbyist's (risk-neutral) utiity:

$$\begin{cases} V - S & \text{, if } P^b \text{ wins;} \\ 0 & \text{, if } P^a \text{ wins;} \end{cases}$$

where $V > 0$ (R.V. with support $[0, +\infty)$)is the lobbyist's reservation value (his private information) obtained from project B aproval over project A, and

$$S = \sum_j B_j$$

is the sum of all bribes paid to politicians.

Lobbyist 2

- If votes are open, lobbyist chooses how much to offer in bribes to each voter that votes for project P^b.
- If votes are anonymous, he offers to pay B to all voters.
- A lobbyist's strategy is characterized by an action for a given voting rule for each realization of V.

Timing

- Events occur in the following order:
  1. The constitution maker chooses an (observable) voting rule
  2. Reservation value V of the lobbyist is randomly draw
  3. Lobbyist observes V and proposes a bribe schedule
  4. Each voter $j \in J$ observes the bribe schedule and votes
  5. The simple majority winner project is implemented, payoffs are realized

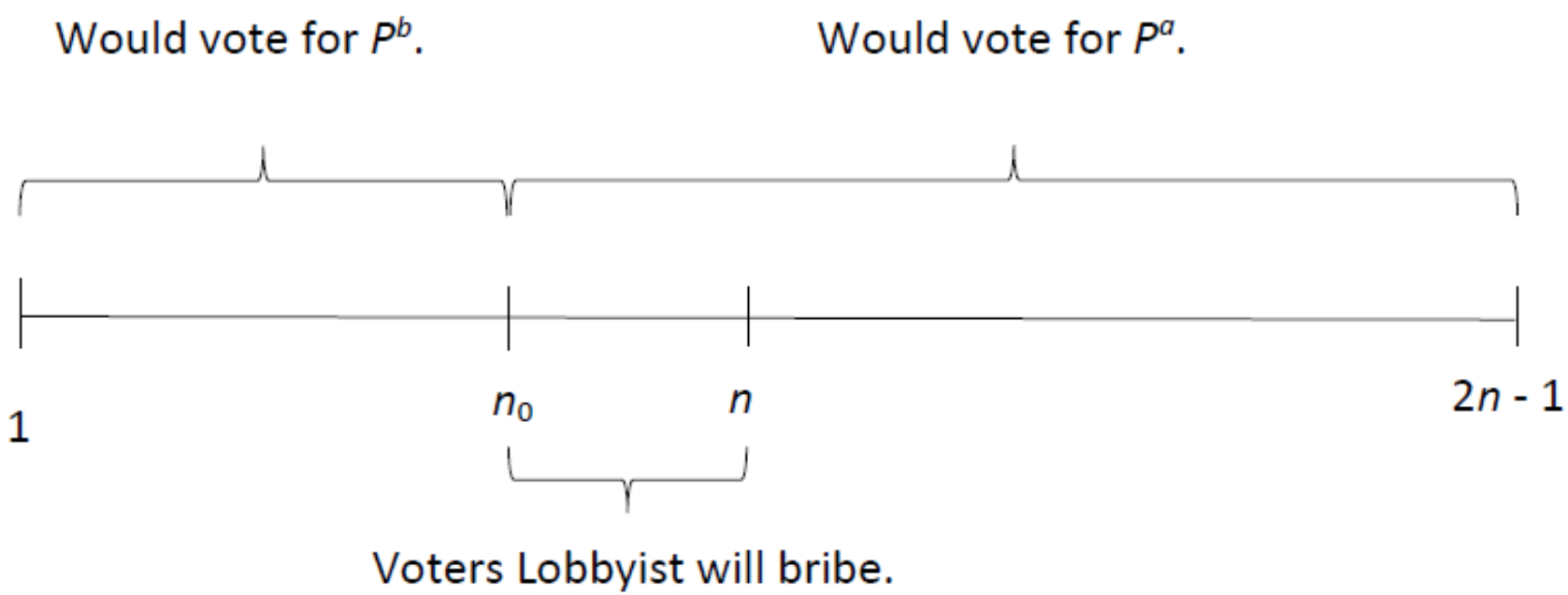
Pivotal Voters

- Whatever the case, the lobbyist does not have to overturn all votes; just those pivotal.
- If $R = 0$, Lobbyist needs to bribe only voters $j \in \{\lfloor h \rfloor + 1, \cdots, n\}$.
- If $R \in [0, (1 - 1/h)\beta]$, Lobbyist needs to bribe only voters $j \in \{\lfloor (1 - R/\beta)\, h \rfloor + 1, \cdots, n\}$.
- If $R > [0, (1 - 1/h)\beta]$, Lobbyist needs to bribe all voters $j \in \{1, \cdots, n\}$.
- Define:

$$n_0 = \begin{cases} 0 & \text{, if } R > (1 - 1/h)\beta \\ \lfloor (1 - R/\beta)\, h \rfloor & \text{, if } j \in \{\lfloor (1 - R/\beta)\, h \rfloor + 1, \cdots, n\} \\ \lfloor h \rfloor & \text{, if } R = 0 \end{cases}$$

- We can summarize the above situations as:
  - Lobbyist needs to bribe voters $j \in \{n_0 + 1, \cdots, n\}$.

Pivotal Voters 2



Bribing Schedules

- The Lobbyist bribing schedule depends on:
  - Information he has about the voters' ideological preferences (Observable vs. Non-Obervable)
  - Voting Rule (Open Vote vs. Anonymous Vote)
- Four cases:

Bribes	*Open Vote*	*Anonymous Vote*
Observable Prefs.	Tailor-Made	Tailor-Made
Non-Observable Prefs.	General Bribes	General Bribes

- Number of votes that are actually paid:

No. of Voters Paid	*Open Vote*	*Anonymous Vote*
Observable Prefs.	$n - n_0$	$n - n_0$
Non-Observable Prefs.	n	$2n - 1$

Observable Legislators' Preferences

- Let us start analyzing the case in which the Lobbyist can observe voters' preferences.
- Lobbyist can make tailor-made offers to each voter in $\{n_0+1, \cdots, n\}$.
- Offers are such that each voter $j \in \{n_0+1, \cdots, n\}$ is indifferent, that is:

$$B_j = R + (-1 + j/h)\beta$$

- The lobbyist's total expenditure is:

$$\begin{aligned} S^{Obs} &= \sum_{j=n_0+1}^{n} \left(R + \frac{(j-h)\beta}{h} \right) \\ &= (n-n_0)(R-\beta) + \frac{\beta}{h} \sum_{j=n_0+1}^{n} j \\ &= \left(\frac{n-n_0}{2h} \right) (2hR + \beta(n+n_0+1-2h)) \end{aligned}$$

Non-Observable Legislators' Preferences

- If preferences are non-observable, then the Lobbyist cannot make customized offers to Legislators.
- The Lobbyist will make a general offer to all Legislators to try and get his favorite project approved.
- Bribe B must be just large enough to make the median voter indifferent, $u_n(P^a) = u_n(P^b)$, that is:

$$\frac{(n-h)\beta}{h} = -R + B$$

- Individual bribe B_{Op}:

$$\frac{(n-h)\beta}{h} = -R + B_{Op} \quad \Leftrightarrow \quad B_{Op} = R + \frac{(n-h)\beta}{h}$$

Non-Observable Legislators' Preferences 1

- The expenditure of the Lobbyist to make project P^b the winner depends on whether the vote is open or anonymous.
- If voting is anonymous, all voters will come to the lobbyist, after P^b's approval, and claim that they voted for P^b. The Lobbyist will have to pay all voters, but $R = 0$:

$$S_{An}^{Non} = (2n-1)B = \frac{(n-h)(2n-1)\beta}{h} \tag{1}$$

- If voting is open, then the Lobbyist can see how each Legislator voted, and pay accordingly. Since only n voters vote for P^b, the Lobbyist pay these n voters.

$$S_{Op}^{Non} = nB = nR + \frac{n(n-h)\beta}{h} \tag{2}$$

Non-Observable Legislators' Preferences 2

- The expenditure of the Lobbyist to make project P^b the winner depends on whether the vote is open or anonymous.
- If voting is anonymous, all voters will come to the lobbyist, after P^b's approval, and claim that they voted for P^b. The Lobbyist will have to pay all voters, but $R = 0$:

$$S_{An}^{Non} = (2n-1)B = \frac{(n-h)(2n-1)\beta}{h} \tag{3}$$

- If voting is open, then the Lobbyist can see how each Legislator voted, and pay accordingly. Since only n voters vote for P^b, the Lobbyist pay these n voters.

$$S_{Op}^{Non} = nB = nR + \frac{n(n-h)\beta}{h} \tag{4}$$

Non-Observable Legislators' Preferences 3: All but One Voters Bribed

- The Lobbyist will prefer to bribe all members of Legislature to bribing no one at all if $V \geq S_x^{Non}$, for $x \in \{An, Op\}$.
- If $V < S_x^{Non}$, it does not mean that will let Legislators vote without influencing the outcome.
- The Lobbyist can randomly pick a Legislator and this voter will not receive a bribe, and pass P^b with a positive probability:
  - If the randomly picked voter is in the Pivotal set $\{n_0 + 1, \ldots, n\}$, project P^b will fail;
  - If the randomly picked voter is in $\{1, \ldots, n_0\} \cup \{n + 1, \ldots, 2n - 1\}$, project P^b will pass.

Non-Observable Legislators' Preferences 4: All but One Voters Bribed

- In this case, P^b passes with probability:

$$\gamma_x(1) = \frac{n_0 + n - 1}{2n - 1}$$

- In a PBE, the Lobbyist will prefer this bribing schedule to both bribing all voters and not bribing any voters if:
  - Anonymous voting:

$$\gamma_{An}(1) V - (2n-2) B \geq \max\{0, V - (2n-1) B\}$$

  - Open voting:

$$\gamma_{Op}(1) V - (n-1) B \geq \max\{0, V - nB\}$$

Non-Observable Legislators' Preferences 5: All but One Voters Bribed

- In this case, P^b passes with probability:

$$\gamma_x(1) = \frac{n_0 + n - 1}{2n - 1}$$

- In a (Completely) Cursed Equilibrium, the Lobbyist will prefer this bribing schedule to both bribing all voters and not bribing any voters if:
  - Anonymous voting:

$$\gamma_{An}(1)[V - (2n-2)B] \geq \max\{0, V - (2n-1)B\}$$

  - Open voting:

$$\gamma_{Op}(1)[V - (n-1)B] \geq \max\{0, V - nB\}$$

Non-Observable Legislators' Preferences 6: All but k Voters Bribed

- If bribing all but one voters does not yield a positive expected surplus to the Lobbyist, he can randomly pick more voters to leabe out of the offer and approve P^b with a smaller probability.
- In expected value, such a strategy might yield a higher payoff than bribing all voters or not bribing anyone at all.
- Project P^b is approved if none of the left-out voters is in the Pivotal set $\{n_0 + 1, \ldots, n\}$.

Non-Observable Legislators' Preferences 7: All but k Voters Bribed

- Project P^b is approved with probability:

$$\begin{aligned} \gamma_x(k) &= \frac{n+n_0-1}{2n-1} \times \frac{n+n_0-2}{2n-2} \times \cdots \times \frac{n+n_0-k}{2n-k} \\ &= \frac{(n+n_0-1)!(2n-k-1)!}{(n+n_0-k-1)!(2n-1)!}. \end{aligned} \tag{5}$$

- In a PBE, the Lobbyist expected utility will once again depend on whether votes are disclosed to the public:
  - If votes are anonymous:

$$\gamma_{An}(k)V - (2n-k-1)B_{Op}$$

  - If votes are open:

$$\gamma_{Op}(k)V - (n-k)B_{Op}$$

Non-Observable Legislators' Preferences 8: All but k Voters Bribed

- Project P^b is approved with probability:

$$\begin{aligned}\gamma_x(k) &= \frac{n+n_0-1}{2n-1}\times\frac{n+n_0-2}{2n-2}\times\cdots\times\frac{n+n_0-k}{2n-k} \qquad (6)\\ &= \frac{(n+n_0-1)!(2n-k-1)!}{(n+n_0-k-1)!(2n-1)!}.\end{aligned}$$

- In a (Completely) Cursed Equilibrium, the Lobbyist expected utility will once again depend on whether votes are disclosed to the public:
  - If votes are anonymous:

$$\gamma_{An}(k)\left[V-(2n-k-1)B_{Op}\right]$$

  - If votes are open:

$$\gamma_{Op}(k)\left[V-(n-k)B_{Op}\right]$$

Optimal Number of Bribes with Anonymous Voting: PBE

- **Anonymous Vote:** Lobbyist prefers "Bribing all but k voters" to "Bribing all but $k-1$ voters" if:

$$\begin{aligned} & \gamma_{An}(k)V - \frac{(n-h)\beta}{h}(2n-k-1) \\ > \quad & \gamma_{An}(k-1)V - \frac{(n-h)\beta}{h}(2n-k). \end{aligned}$$

that is, if:

$$V < \overline{V}_{An,-k} \equiv \frac{(n-h)\beta}{h} \cdot \frac{(n+\lfloor h \rfloor - k)!(2n-1)!}{(n+\lfloor h \rfloor)!(2n-k-1)!}. \tag{7}$$

- Because $n > h$, we have that $(2n-k-1)! > (n+\lfloor h \rfloor - k)!$. It follows that variable $\overline{V}_{An,-k}$ is an increasing function of k. This violates our original assumption.
- **There is no PBE in which some voters are bribed and some are not**.

Optimal Number of Bribes with Anonymous Voting: Cursed Equilibrium

- **Anonymous Vote:** Lobbyist prefers "Bribing all but k voters" to "Bribing all but $k-1$ voters" if:

$$\begin{aligned} & \gamma(k)\left(V-\frac{(n-h)\beta}{h}(2n-k-1)\right) \\ > \quad & \gamma(k-1)\left(V-\frac{(n-h)\beta}{h}(2n-k)\right). \end{aligned}$$

that is, if:

$$V<\overline{V}_{An,-k}\equiv B_{An}\left(2n-k-1+\frac{\gamma(k-1)}{\gamma(k-1)-\gamma(k)}\right). \qquad (8)$$

- The lobbyist expenditure is:

$$S_{An,-k}^{Non}=(2n-k-1)\,B_{An}=\frac{(n-h)\beta}{h}(2n-k-1).$$

Optimal Number of Bribes with Open Voting: PBE

- **Open Vote:** Lobbyist prefers to bribe k voters over $k-1$ voters if:

$$\gamma_{Op}(k-1)V-(n-k+1)B_{Op}<\gamma_{Op}(k)V-(n-k)B_{Op}.$$

that is, if:

$$V<\overline{V}_{Op,-k}\equiv\left(\frac{2n-k}{n-n_0'}\right)B_{Op}.$$

- The lobbyist expenditure is:

$$S_{Op,-k}^{Non}(k)=(n-k)\,B_{Op}=(n-k)\left[R+\frac{(n-h)\beta}{h}\right]$$

- $S_{Op,-k}^{Non}=(n-k)D_{Op}<\gamma_{Op}(k)\,\overline{V}_{Op,-(k-1)}$ if and only if:

$$n-n_0'<\gamma_{Op}(k)\,\frac{2n-k-1}{n-k}<1$$

- **There is no PBE in which some voters are bribed and some are not.**

Optimal Number of Bribes with Open Voting: Cursed Equilibrium

- **Open Vote:** Lobbyist prefers to bribe k voters over $k-1$ voters if:

$$\gamma_{Op}(k-1)\left(V-(n-k+1)B_{Op}\right)<\gamma_{Op}(k)\left(V-(n-k)B_{Op}\right).$$

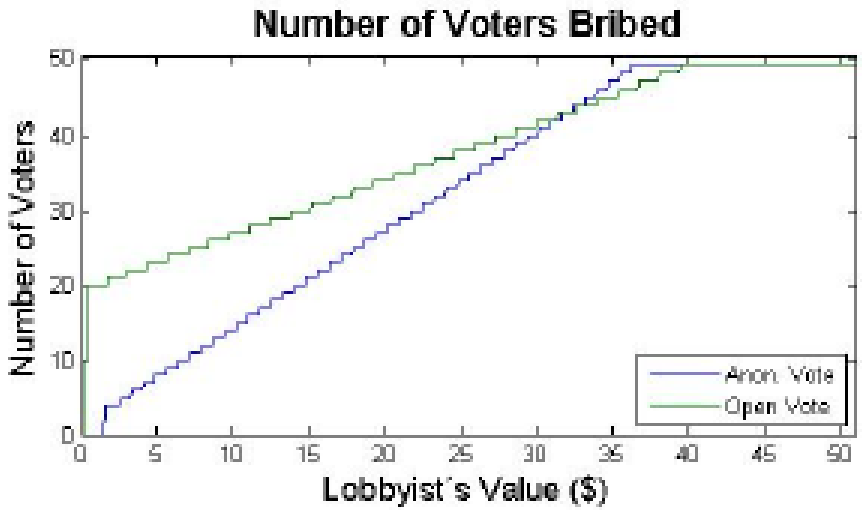
that is, if:

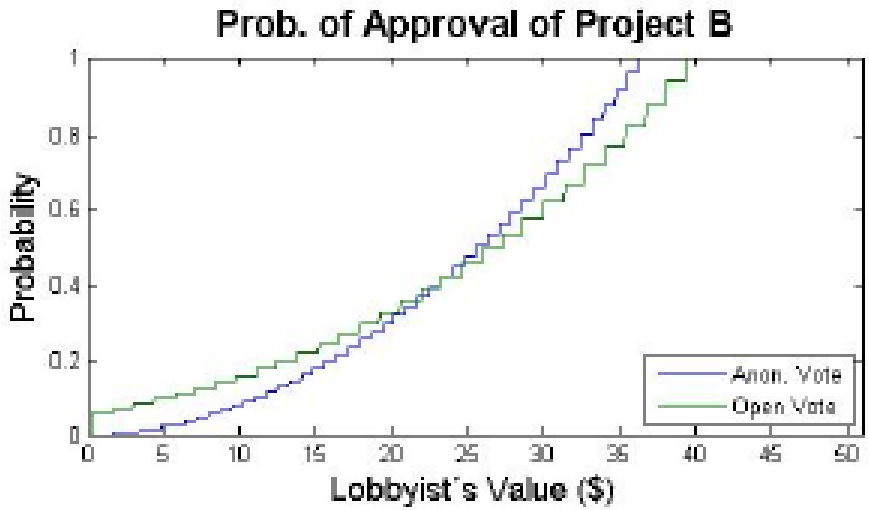
$$V<\overline{V}_{Op,-k}\equiv\left(\frac{n^2+2n-(n+1)k}{n}\right)B_{Op}.$$

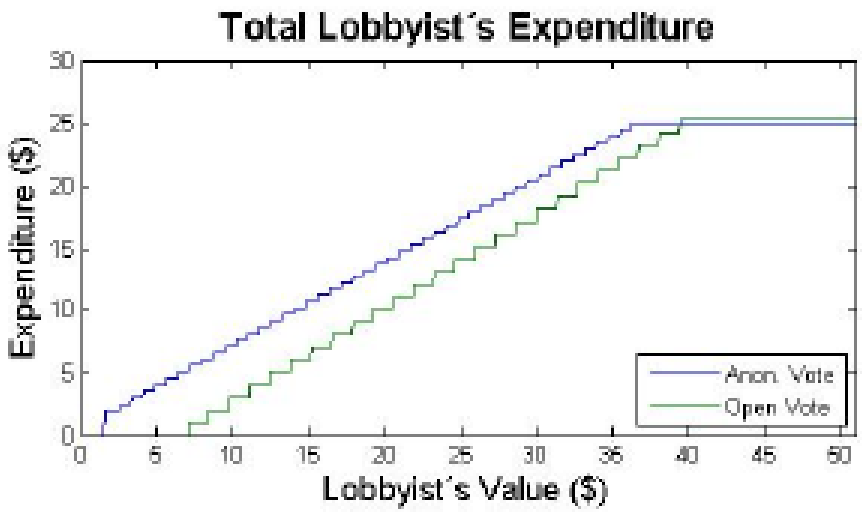
- The lobbyist expenditure is:

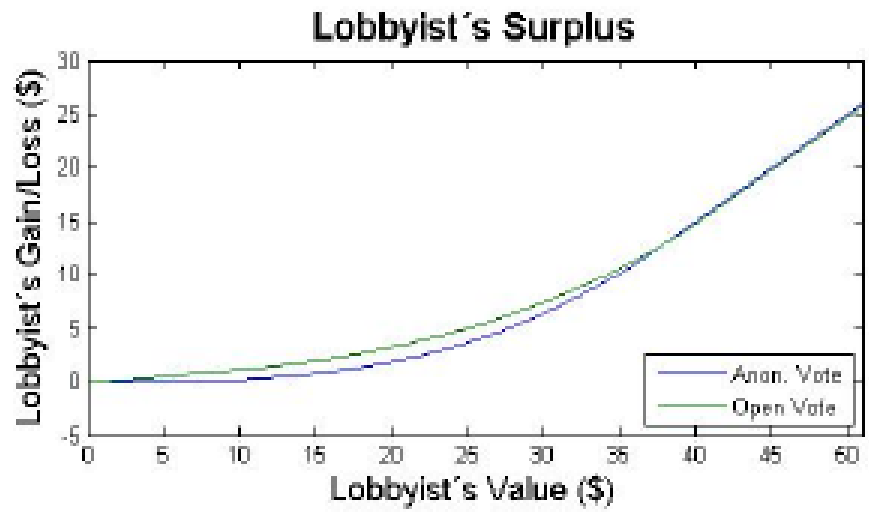
$$S^{Non}_{Op,-k}(k)=(n-k)\,B_{Op}=(n-k)\left[R+\frac{(n-h)\beta}{h}\right]$$

Optimal Number of Bribes: Example









Comparing the Voting Rules (Cursed Eq.): Observable Case

- **CM** minimizes the probability that project P^b wins by minimizing probability that $S < V$.
- **CM** chooses voting rule that *maximizes* the expected expenditure of lobbyist

Proposition

If lobbyist can observe all the voters' preferences, then open voting leads to a larger expenditure for the lobbyist. Mathematically:

$$S_{Op}^{LR} > S_{An}^{Obs}, \qquad S_{Op}^{SR} > S_{An}^{Obs}$$

Under observability, **CM** *prefers Open Voting, regardless of magnitude of* R

Comparing the Voting Rules (Cursed Eq.): Non-Observable Case

- The lobbyist can adopt different strategies according to V.
- Moreover, the strategy depends on the voting rule (Anonymous or Closed).
- Different strategies $=>$ different probabilities of P^b approval.
- Maximizing the Lobbyist's expenditures no longer gives the efficient solution.
- We need to look at P^b probability of approval.
- Questions:
  - Is there a rule that dominates the other?
  - If not, is there a combination of parameters that makes one rule dominant?

Non-Observable Case: Example 1

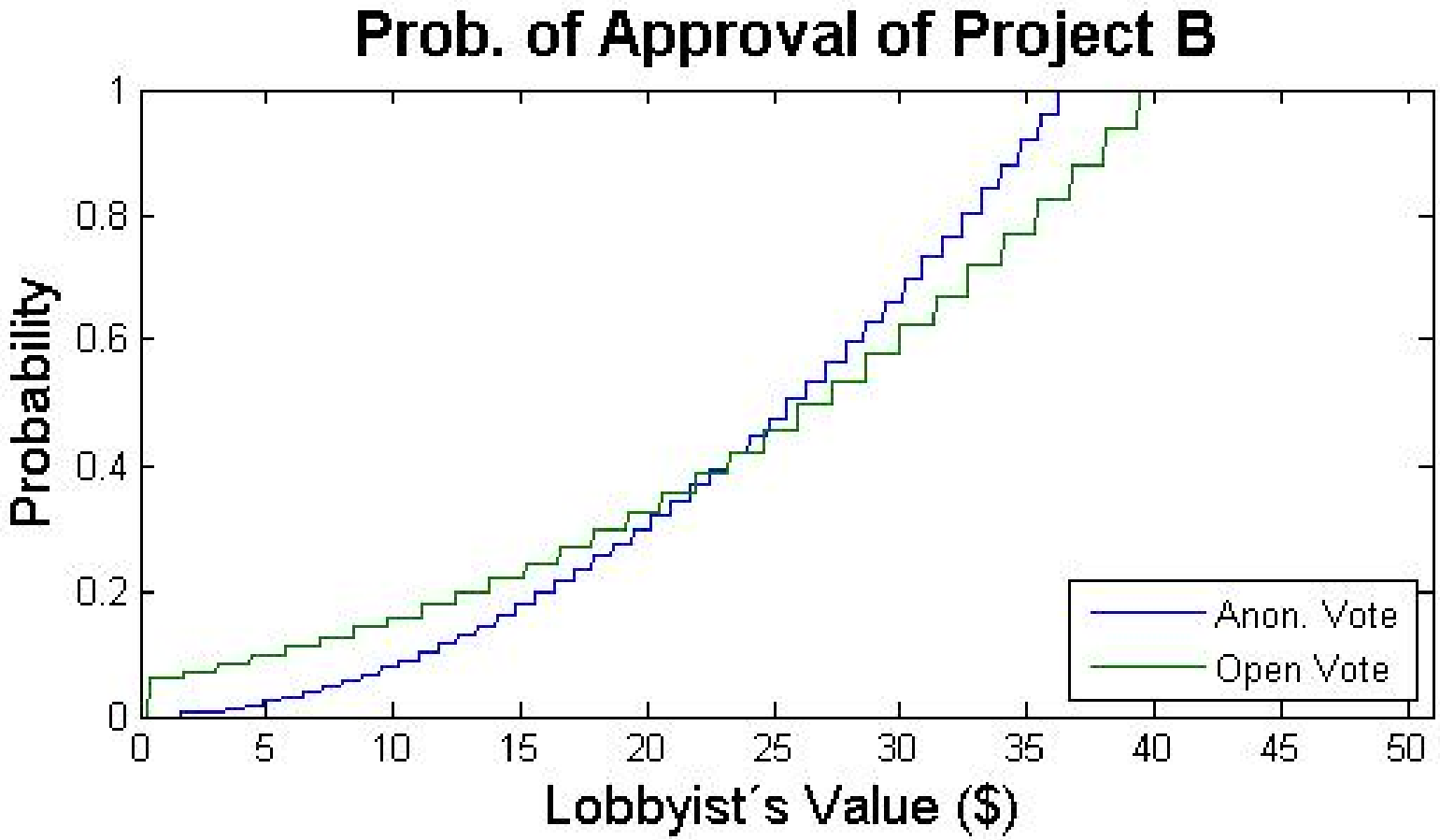


Figure: Parameter values: $n = 25, \beta = 8, h = 23.5, R = 0.5$

Non-Observable Case: Example 2

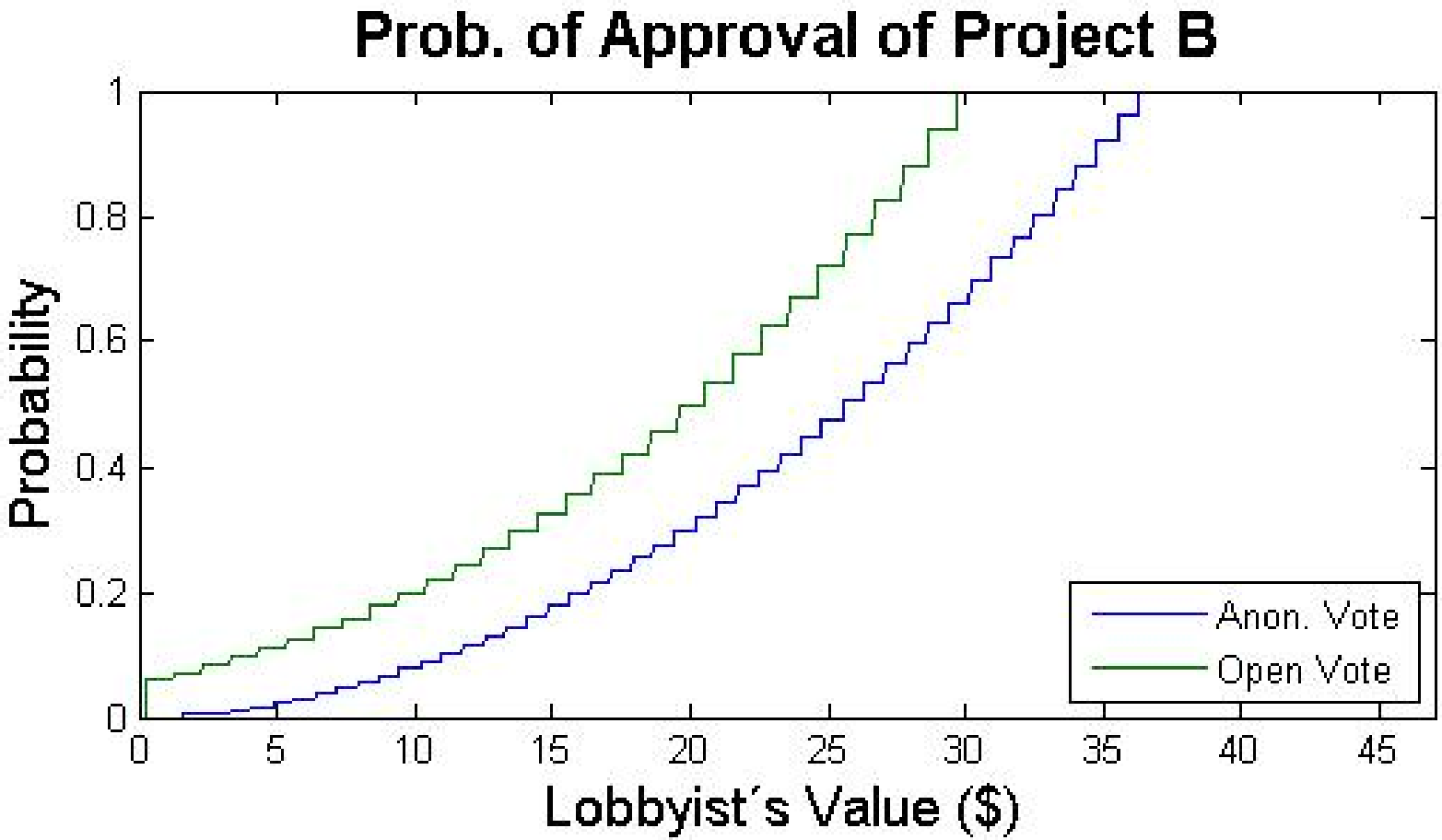


Figure: Parameter values: $n = 25, \beta = 8, h = 23.5, R = 0.25$

Non-Observable Case: Example 3

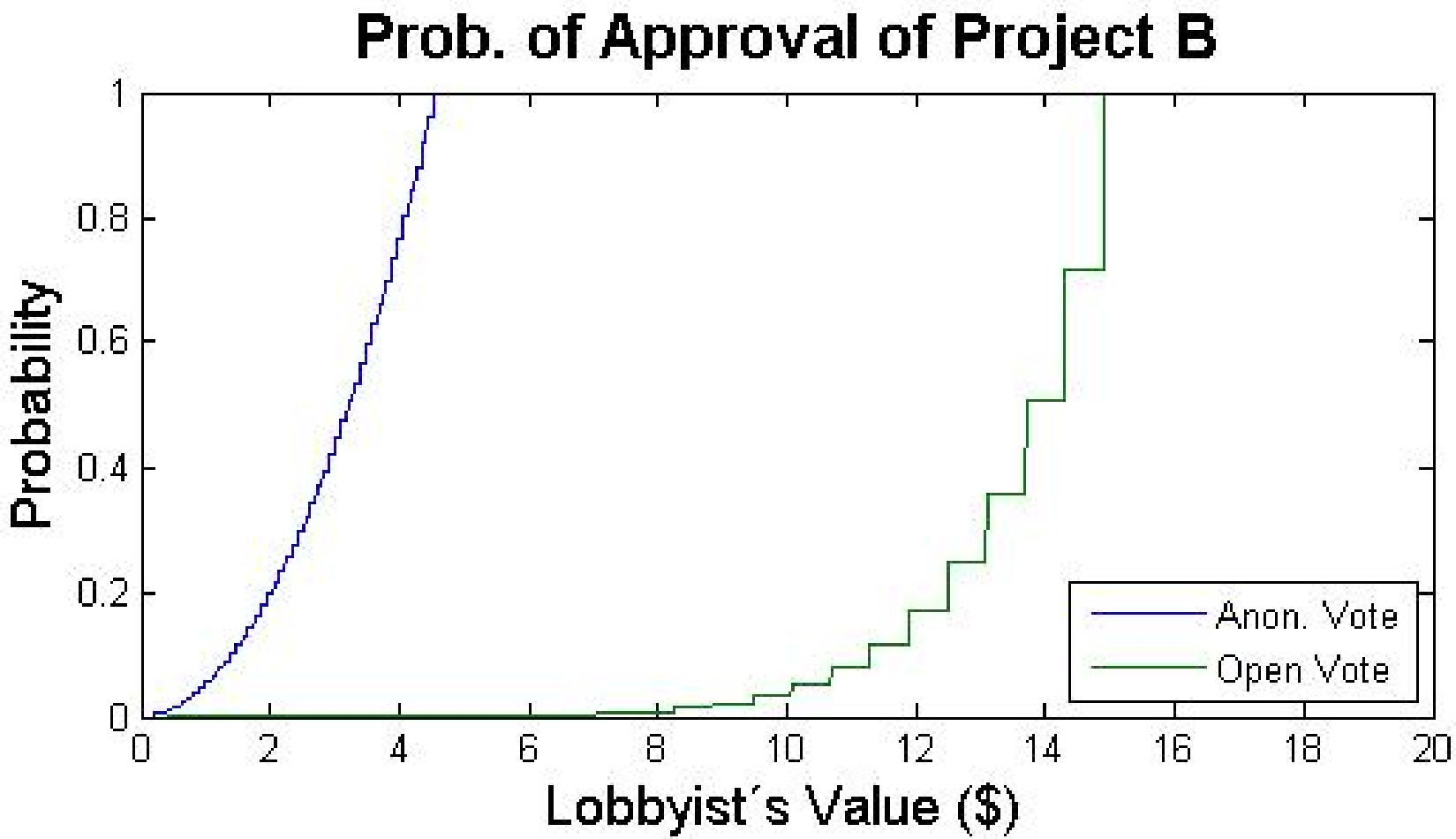


Figure: Parameter values: $n = 25, \beta = 1, h = 23.5, R = 0.5$

Concluding Remarks 1

- This paper tries to shed some light over the issue of Legislature vote public disclosure.
- We modeled a legislature with mandatory voting (no abstentions) in which a lobbyist tries to influence the outcome towards an inefficient project.
- PBE:
  - If the project is highly valued by the lobbyist, he will bribe all voters needed to pass his bill.
  - If the project has low value to the lobbyist, he will let the efficient project pass.
  - No intermediate outcomes.

Concluding Remarks 2

- Cursed Equilibria:
  - If the project is highly valued by the lobbyist, he will bribe all voters needed to pass his bill.
  - If the project has low value to the lobbyist, he will let the efficient project pass.
  - For intermediate project values, if voters' utilities are not observable, the lobbyist will randomly bribe a number of voters smaller than needed to pass the bill with certainty:
    - The number of voters bribed increase with project value;
    - Project probability of approval is a step function increasing in project value.

Concluding Remarks 3

- In a Cursed Eq., if voters' preferences are observable, then the open vote rule yields a more efficient outcome.
- In a Cursed Eq., if voters' preferences are not observable, results depend on parameter values:
  - High reputation costs R tend to benefit the open vote rule;
  - High importance of the issue voted to the voters (β) tends to benefit the anonymous vote rule;
  - High importance of the issue voted to the lobbyist (V) tends to benefit open vote.