ENGLISH VERSION

GAMBLING WITH THE VOTE: A FORMAL THEORY OF THE INFLUENCE OF MATERIAL AND IMMATERIAL INCENTIVES AND THE ELECTORAL ENVIRONMENT OVER VOTING BEHAVIOR[1]

Introduction

When would exogenous incentives outweigh intrinsic party or policy preferences in a person's voting decision-making process? When considering the subject of voting behavior, scholars have found that partisanship and ideological self-identification are the main explanatory variables of vote choice, at least in electoral systems where political parties have clearly defined policy or ideological positions (Campbell et al. 1960; Green, Palmquist and Schickler 2002; Kinder and Kalmoe 2017; Carlin, Singer and Zechmeister 2015). Nevertheless, there exist cases in which voters would cast a vote for a party that they do not like and that does not align with their ideological preferences (Cantú 2019; Ferguson, Molina and Riaño 2018; Stokes 2005; White and Laird 2020; Nichter 2008). So, why would individuals vote this way? The first answer that might come to mind is that this happens because of clientelism (Cantú 2019; Allen 1993; Gosnell 1937; Gosnell 1933; Nichter 2008; Nichter and Nunnari 2022; Nichter and Peress 2017; Stokes 2005; Larreguy, Marshall and Querubín 2016; Rueda 2017). While this is true in many cases, one must ask why a person is willing to sell her vote. Once again, the answer might be simply because of the benefits associated with doing it. After all, a voter might know that their single vote will not be enough to get their preferred electoral outcome; thus, a higher payoff is associated with selling their vote than voting their preferred choice.

The phenomenon of clientelism clearly shows that people make considerations beyond their party, policy, or ideological preferences when making an electoral choice. These preferences can be understood as intrinsic motivators for supporting a particular

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electoral option; nevertheless, as clientelism shows, exogenous factors also influence voters' decision-making. The expectation of an external incentive can potentially alter an individual's electoral behavior. Now, while it might be the most evident, clientelism is not the only political phenomenon that can act as an exogenous influence over a person's vote choice. Tight social norms about political behavior impose costs and rewards over the actions of individuals (Iyengar, Konitzer and Tedin 2018; Cruz 2019). An example of this is the voting behavior of African-Americans. This racial group faces a socially enforceable norm that pressures them into supporting the Democratic party, regardless of their personal ideological leanings (White and Laird 2020).

Similarly, this phenomenon might be at play in the Latino Evangelical community in the United States. For them, a religious norm might be pushing them towards the Republican party (Pew Research Center 2007; Pew Research Center 2014). Further, religious norms also seem to affect voters' behavior in some Latin American countries (Boas and Smith 2015; Armas Asín 2022). Now, just as with clientelism, for exogenous factors to influence voting behavior, there should exist a perception that the entity that offers the exogenous incentive has some capacity to monitor and reward–or punish–the voter's behavior. In the case of clientelism, this might be done through the party machine (Stokes 2005; Nichter 2008; Larreguy, Marshall and Querubín 2016; Rueda 2017; Gosnell 1937; Gosnell 1933); for social norms, the in-group's density that enforces the behavior might function as the monitor (Cruz 2019; White and Laird 2020). For religious groups, the religious norms, religiosity, or a belief in the enforcement of supernatural incentives may be akin to monitoring–at least from the perspective of the religious voter (Boas and Smith 2015; Fudenberg and Levine 2006).

Considering this, I present a voting game that advances a formal theory of voting behavior when exogenous incentives influence it. This voting game shows an individual may be willing to sell their vote under not very stringent conditions. Moreover, in some scenarios, it only takes a slight perception of potentially being rewarded or punished for the voter to change their vote, especially when the incentive offered is large. While these findings echo those of past research on the subject of clientelism (Stokes 2005; Nichter and Nunnari 2022; Nichter and Peress 2017), the model focuses on the decision-making process of a voter as a strategic response to the actions of their fellow voters. Further, the behavior

of voters is a response to exogenous incentives beyond those material ones associated with clientelism. Thus, this model can also be helpful for understanding the influence of the electoral environment and immaterial incentives–like social or religious rewards and punishments–over voting behavior.

Before introducing the model, I provide a brief overview of past research on voting behavior determinants relevant to this theory. Then, as I describe the voting game, I present the equilibria of interest and its predictions. After describing the game, I illustrate the propositions derived from the model using examples from the Gilded Age and Progressive Era, African American voting behavior, and religious voting, all of these within the context of the United States of America. These examples are helpful since they show how changes in the incentives faced by voters–along with the perceptions voters have that they will be rewarded or punished–affect their electoral behavior. Furthermore, these cases involve both material and immaterial exogenous incentives.

Determinants of voting behavior

To this day, political scientists have a better understanding of what drives people to the voting booth. After Downs (1957), and later Riker and Ordeshook (1968), showed the theoretical irrationality of voting, numerous studies have explored the determinants of voter turnout to make sense of the paradox of voting participation. We now know that there exist social (Funk 2010; DellaVigna et al. 2017; Nickerson 2008; Gerber, Green, and Larimer 2008; Gerber, and Green 2000), psychological (Gerber et al. 2011; Shayo and Harel 2012; Mondak and Halperin 2008), and even rational self-interest (Gerber et al. 2013; Heckelman 1995; Levine and Palfrey 2007; Edlin, Gelman and Kaplan 2007; Nichter 2008) reasons for individuals to cast their votes. What is evident today is that voting motivations go well beyond the mere calculation of the benefits associated with an individual's preferred candidate times the probability of casting the deciding vote of the election. In rational-choice terms, voters derive most of the utility from voting for reasons other than the possibility of changing the election outcome.

Now, if voters are primarily drawn to the voting booth for reasons other than potentially changing the election result, one should wonder on what basis voters are making their choices in the voting booth. The most obvious answer would be that once in the voting

booth, voters are mainly guided by their partisan or ideological attachments, and–for the most part–this would be an accurate conclusion (Campbell et al. 1960; Green, Palmquist and Schickler 2002; Kinder and Kalmoe 2017; Carlin, Singer and Zechmeister 2015). In addition, the evaluation of government performance–particularly on recent events and economic subjects–along with demographic variables are helpful in explaining vote choice (Converse 1964; Zaller 1992; Fiorina 1981; Hansford and Gomez, 2015; Healey and Lenz 2014). Now, just as the decision of turning out to vote may be driven by incentives unrelated to the utility derived from the electoral result–given that the probability of casting the decisive vote is relatively low–the vote choice once in the voting booth is sometimes also influenced by factors that are not related with the voter's party or policy preferences. This could mean that the voter may end up voting against the party that would support policies that could yield the most benefit to them (Nichter 2008; Cantú 2019; Stokes 2005; Ferguson, Molina and Riaño 2018; White and Laird 2020; Roemer 1998; Frank 2004; De la O and Rodden 2008). It could be argued that, in these cases, the voter's decision is influenced by exogenous incentives or, said another way, incentives that are not directly linked to the benefits that a candidate's proposed policies would have over the voter's utility if said candidate wins the election.

Exogenous incentives, in this context, can be understood as rewards or punishments that voters perceive they might receive if they vote in a certain way. It is essential to note that these incentives can be either material or immaterial. While it is easy to think of exogenous incentives as material incentives, especially when considering phenomena like vote-buying and clientelism, immaterial incentives are not always as evident. These types of incentives can come in the form of social punishments, like ostracism or shaming, when an individual deviates from the voting behavior expected from them, regardless of their personal political preferences (White and Laird 2020; Cruz 2019). Religious incentives also fall under this category, as a particular faith or creed may teach its followers that their voting behavior can be punished or rewarded by a supernatural entity (Stewart 2016; Schwartz and Priest 2022; Byrd 2022).

Exogenous incentives are usually independent of the electoral result, although they can also be contingent not on individual behavior but on the outcome of the election (Cantú 2019; Kramon 2016). In those cases where the incentive is linked to individual voting

behavior, its effectiveness in influencing vote choice relies on the credibility of the promise or threat of receiving the aforementioned incentive. This credibility, in turn, depends on the resources available to the candidate or party for rewarding or punishing voters and their ability to monitor the behavior of voters (Calvo and Murillo 2004; Stokes 2005; White and Laird 2020; Kramon 2016; Grenne and Simpser 2020). On the one hand, available resources constrain the number and size of the incentives a candidate can offer, or if they can offer any at all (Calvo and Murillo 2004; Stokes 2005; Nichter 2008; Beltrán and Castro Cornejo 2019). On the other, monitoring, or at least voters' perception of being monitored, is necessary to increase the probability that voters that were promised an incentive vote as instructed (Stokes 2005; Larreguy, Marshall and Querubín 2016; Rueda 2017; Cruz 2019; White and Laird 2020; Grenne and Simpser 2020).

While parties or candidates may offer gifts or favors during campaigns even when their monitoring capacity is low or non-existent, it seems that in such cases, the primary function of these gifts is to offer information about the candidates that distribute them and not vote-buying (Kramon 2016; Beltrán and Castro Cornejo 2019). Thus, in this scenario, voters who cast a vote in favor of the candidate that distributed gifts are casting a vote for a candidate they intrinsically prefer. That is, since the function of the gifts is to communicate the capacity of the candidate to distribute resources among their constituency, voters that support this candidate have been convinced that they are the superior electoral choice (Kramon 2016). These voters decide only based on the utility they associate with each candidate winning the election and not on the promise of an exogenous incentive linked to their individual voting behavior. Therefore, the distribution of gifts may persist in these settings despite the lack of monitoring; nevertheless, when candidates offer incentives to motivate individuals to vote against their preferred candidate or to mobilize apathetic voters, monitoring becomes essential to avoid defection (Stokes 2005; Nichter 2008; Cruz 2019; Heckelman 1995; Larreguy Marshall and Querubín 2016; Rueda 2017; Nichter and Nunnari 2022).

Like other private individual behaviors that tend to change as they become visible (Sexton, and Sexton 2014; Friedrichsen, and Engelmann 2017; Benabou, and Tirole 2006), voting behavior is affected by the perception of being monitored. Concretely, there are two different scenarios under which an individual's voting behavior may change as they know,

or at least perceive, that their vote is not secret. First, a person might vote due to peer pressure. For instance, if the person believes that voting is a civic duty and, similarly, they think that their peers might know if they voted or not, they will be incentivized to do it to send the signal that they are meeting their democratic responsibilities (DellaVigna et al. 2017; Funk 2010). Notice that in this situation, the vote choice is still secret; it is just the act of voting that is public. The individual votes to let other citizens know they have accomplished their civic duty.

Second, voters might think someone interested in their electoral choice can observe their vote. This potential observer could either offer a reward or threaten to punish individual voters depending on their decisions in the voting booth. Hence, if voters believe that it is likely that the monitor can observe their decision, the first consequence of this will be that there will be an increase in turnout (Heckelman 1995; Vicente 2014; Nichter 2008; Rueda 2017; Larreguy, Marshall and Querubín 2016). It would be evident to the monitor that those who did not vote have not supported the monitor's preferred option; thus, abstaining would not be an alternative when people believe it is plausible that their vote could be observed. There could be instances in which believing that one's vote is not secret could decrease turnout, but in these cases, what causes this particular outcome is not the potential incentives that a monitor offers; actually, there might not be a monitor at all. It appears that, in a context like this, people do not participate in the election because they do not trust electoral institutions. Since no credible threats or rewards are involved in this scenario, voters decide to abstain altogether (Gerber et al. 2013). Nevertheless, evidence shows that when either punishments or rewards are credible to voters, they not only participate in the election, but some of them even engage in other political behavior that makes evident to the political party or candidate that they have upheld their part of the clientelist bargain (Nichter and Nunnari 2022). Hence, as long as an incentive is associated with a specific vote choice and voters perceive that they are being observed, turnout can be expected to increase.

A rise in participation during the election is not the only effect of voters perceiving they are being monitored. The most important outcome associated with the lack of secrecy of the vote is that people might vote differently from what they would do if they knew that no one was watching their choice. For instance, political minorities will restrain from

expressing their actual preferences in the voting booth if they know that either the government or the majority in power can see that they are voting in a way that goes against the preferences of said majority (Karpowitz et al. 2011). It is worth mentioning that even when minorities may support the majority party in a particular region due to the spillover benefits they get from pork-barrel projects that the region receives from the majority party (Ichino and Nathan 2013), this does not imply that minorities in these cases never have to hide their real electoral preferences. If the vote is not guaranteed to be secret, then voters could be hiding their real preferences to avoid conflict with their peers who have voted with the majority or with those who have a high stake in the election (Robbins 2007). Furthermore, if the vote is potentially visible, voters will tend to display a more prosocial voting pattern to prevent appearing as uncooperative or even immoral (Feddersen, Gailmard and Sandroni 2009; Morton and Ou 2019).

Finally, it is important to note that the perception of pivotality also factors into deciding how to vote and the effectiveness of exogenous incentives. Perception of pivotality can affect the weight that the degree of belief that one is being monitored has over a person's vote choice. Knowing that one has a high probability of being pivotal in an election can alter a voter's behavior. Experimental evidence shows that voters abstain–if given the possibility–when they do not have enough information about the possible outcomes and are the deciding vote in an election (Battaglini, Morton and Palfrey 2010). Similarly, Feddersen, Gailmard, and Sandroni show that people are more likely to vote for a morally desirable prosocial choice over a selfish one when their vote is not pivotal; but in a close election, voters tend to choose the selfish option (2009). Now, it can be argued that pivotality seldom plays a role in real-life settings. Nevertheless, Rueda shows that voters in small electoral sections value their vote more since it can be decisive for the result in that particular section (2017). Further, Edlin, Gelman and Kaplan prove that when voters take into account the perceived benefits to the society associated with their preferred candidate, the role of pivotality becomes non-trivial (2007).

Taking these factors into account, in what follows, I present a voting game that models the behavior of voters when facing exogenous incentives in their voting calculations.

The voting game

Consider a society with n voters, where $n \geq 3$ and n is an odd number. Voters believe that there is some probability that they will receive an exogenous incentive—either a punishment or a reward—from a monitor depending on their voting choice. The voters' assessment of this probability—their belief—is given by π_i for all $i = (1, \dots, n)$. Thus, the probability they assign to not receiving an incentive from a monitor is $1 - \pi_i$. A punishment is denoted as P, and it is smaller than or equal to 0. Conversely, a reward is denoted as R, and it is larger than or equal to 0. Both P and R do not vary among individuals[2].

Voters cast their votes, v_i, simultaneously. Each $v_i \in V$, and $V = \{M, NM\}$. A vote $v_i = M$ means that voter i votes for the monitor's preferred option. On the other hand, $v_i = NM$ is the vote of voter i for the alternative not preferred by the monitor. If voter i believes that there is no monitor and $\sum_{i=1}^{n} I_{v_i=M} \geq \frac{n+1}{2}$, then voter i expects a payoff b_i, regardless of how i voted[3]. However, i would expect $b_i + R$, in case they voted M and $b_i + P$, if they voted NM and is certain that a monitor can observe her behavior. On the other hand, if $\sum_{i=1}^{n} I_{v_i=M} < \frac{n+1}{2}$, voter i gets expects payoff s_i, if they believe that they will not receive an incentive for their vote choice. Hence, parameter b_i represents the utility that the voter receives when M wins the election, and s_i is the utility the voter receives when NM wins.

If a voter is certain that they will receive an incentive of their voting behavior, that is when $\pi_i = 1$, voter i's would expect a payoff $s_i + R$ if she voted M and $s_i + P$ if she voted NM. Note that both s_i and b_i are in the benefits set $B = (-\infty, \infty)$, this is assumed for simplicity. Additionally, something that is substantially important in this model is the distance between s_i and b_i, as this represents the difference in the preferences of voter i for

[2] Those who receive R get the same quantity of it, and the same is true for those who receive P. This modelling decision is made for the sake of simplicity; however, the game could allow for more flexibility to allow for incentives to vary for each voter. The logic and predictions of the model and predictions of the game stand even in this more flexible scenario.

[3] $I_{v_k} = M$ is an indicator variable for a voter i that votes for M. Therefore, $\sum_{k=1}^{n} I_{v_k=M}$ represents the sum of all votes in a constituency of size n in favor of M.

each candidate. Similarly, the difference between P and R is also essential, as it determines the size of the incentive offered. Considering this, the utility function of voter i is[4]:

$$u_i(v_1, \dots, v_n, \pi_i) = \begin{cases} \pi_i(b_i + P) + (1 - \pi_i)(b_i), \ \ for\ v_i = NM\ and \sum_{k=1}^{n} I_{v_k=M} \geq \dfrac{n+1}{2} \\ \pi_i(b_i + R) + (1 - \pi_i)(b_i), \ \ for\ v_i = M\ and \sum_{k=1}^{n} I_{v_k=M} \geq \dfrac{n+1}{2} \\ \pi_i(s_i + P) + (1 - \pi_i)(s_i), \ \ for\ v_i = NM\ and \sum_{k=1}^{n} I_{v_k=M} < \dfrac{n+1}{2} \\ \pi_i(s_i + R) + (1 - \pi_i)(s_i), \ \ for\ v_i = M\ and \sum_{k=1}^{n} I_{v_k=M} < \dfrac{n+1}{2} \end{cases}$$

This utility function reduces to:

$$u_i(v_1, \dots, v_n, \pi_i) = \begin{cases} b_i + \pi_i P, for\ v_i = NM\ and \sum_{k=1}^{n} I_{v_k=M} \geq \dfrac{n+1}{2} \\ b_i + \pi_i R, for\ v_i = M\ and \sum_{k=1}^{n} I_{v_k=M} \geq \dfrac{n+1}{2} \\ s_i + \pi_i P, for\ v_i = NM\ and \sum_{k=1}^{n} I_{v_k=M} < \dfrac{n+1}{2} \\ s_i + \pi_i R, for\ v_i = M\ and \sum_{k=1}^{n} I_{v_k=M} < \dfrac{n+1}{2} \end{cases}$$

Benchmark predictions

Consider the different possible combinations of a society where there are three voters ($n = 3$) and two different types of voters. The first group of voters are considered believers for sure since they are certain that they will receive the promised incentive from the monitor ($\pi_i = 1$ for all i). The second group, referred to as non-believers henceforth, is certain that they will not receive the incentive offered by the monitor ($\pi_j = 0$ for all j). Additionally, assume that $b_i \leq s_i$ for all i and $b_j \leq s_j$ for all j , so that the benefit from NM

[4] This is the simplest version of this voting game, but it could be modified to make it more flexible to different contexts. Both b_i and s_i could be expressed as a quadratic disutility rather than as fixed quantities, just as it is usually done in one-dimensional voting games. I choose to model benefits the way I have described above to simplify the initial analysis of this voting game and focus on the effects of the possibility of punishments and rewards enforced by an external monitor, and how the personal belief about the possibility of it being real can affect decision-making. Nevertheless, this does not mean that this model could—or should—not be changed to allow for a quadratic disutility function for the payoffs associated with the chosen alternative.

being the election outcome is larger than or equal to the benefit derived from M being the winner of the election.

First, I investigate the case in which all voters are believers. For this scenario, the utility function of voter i reduces to:

$$u_i(v_1, \dots, v_n \mid \pi_i = 1) = \begin{cases} b_i + P, for\ v_i = NM\ and \sum_{k=1}^{n} I_{v_k=M} \geq \frac{n+1}{2} \\ b_i + R, for\ v_i = M\ and \sum_{k=1}^{n} I_{v_k=M} \geq \frac{n+1}{2} \\ s_i + P, for\ v_i = NM\ and \sum_{k=1}^{n} I_{v_k=M} < \frac{n+1}{2} \\ s_i + R, for\ v_i = M\ and \sum_{k=1}^{n} I_{v_k=M} < \frac{n+1}{2} \end{cases}$$

Different equilibria could arise, depending on the values of P and R. To explore the simplest—yet interesting—of these equilibria let $b_i + R > s_i + P$. Then, the ranking of voter i's possible payoffs is:

$$b_i + P \leq s_i + P < b_i + R \leq s_i + R$$

This means that, in this case, the worst possible outcome for i occurs when they vote NM and M is the winner of the election. On the other hand, the best possible outcome is that NM is chosen by the majority, whereas voter i voted M. In this case, the candidate with the largest benefit for i is chosen (since $b_i \leq s_i$), while i additionally expects to receive R for sure due to supporting the monitor's preferred candidate. Not surprisingly, there exists a single pure Nash equilibrium in which all voters choose M, and they all get $b_i + R$, which is their second-best outcome.

Substituting one believer for a non-believer in the set of voters results in an additional possible equilibrium. To describe the equilibria for this setting, and for the rest of possible combinations of believer and non-believer voters, consider the utility function of voter j when they are a nonbeliever for sure:

$$u_j(v_1, \dots, v_n \mid \pi_j = 0) = \begin{cases} b_j, for\ v_j = NM\ and \sum_{k=1}^{n} I_{v_k=M} \geq \dfrac{n+1}{2} \\ b_j, for\ v_j = M\ and \sum_{k=1}^{n} I_{v_k=M} \geq \dfrac{n+1}{2} \\ s_j, for\ v_j = NM\ and \sum_{k=1}^{n} I_{v_k=M} < \dfrac{n+1}{2} \\ s_j, for\ v_j = M\ and \sum_{k=1}^{n} I_{v_k=M} < \dfrac{n+1}{2} \end{cases}$$

If it is also assumed that $b_j \leq s_j$ for all j, then voter j prefers that NM is the winner of the election, regardless of how she votes. Furthermore, if M wins the election, then whatever j's vote is, j's payoff is b_j; which is their worst possible outcome. Under these conditions, there exist two pure Nash equilibria. In both, the believers always vote M and receive their second-best payoff, $b_i + R$, while the non-believer is indifferent between voting M or NM since she receives b_j anyhow. Thus, if the non-believer is the minority, then they will always get the worst possible outcome, and their vote is inconsequential.

Now, consider the case in which two of the three voters are non-believers for sure, and the other one is a believer for sure. In this case, the believer's best response is to vote M, although their payoffs vary depending on the choices of the other voters. Non-believers, on the other hand, have two equilibrium behaviors. A non-believer would be indifferent between voting M and voting NM, conditional on the other voters choosing M. Thus, all voters choosing M is an equilibrium. The believer would receive $b_i + R$, while the non-believers would receive b_j.

However, this equilibrium relies on the non-believers being indifferent between voting for M and voting for NM. If a non-believer were pivotal, they would vote for NM since this would give the non-believer voter their best possible payoff. Since the believer always votes M, the votes of the non-believers decide the election; therefore, a non-believer can vote for NM and do no worse than receiving b_j, while they can potentially get s_j, which is their best possible outcome. Thus, a non-believer voter weakly prefers voting for NM, and this makes the equilibrium of the believer voting for M and the non-believers voting for NM the one that should be expected. Consider this situation as represented in an extended version of this game, in which voters vote sequentially. If voters know the potential payoffs, through backward induction, they will select the best possible outcome, in which

both non-believers get s_j, and the believer gets $s_i + R$. This would be the subgame perfect equilibrium, and in it, all non-believers vote NM, and the believer votes M.

Finally, consider the case in which all voters are non-believers. There exist equilibria in which either one or the three voters choose M (receiving b_j in the latter case). However, this just happens when the rest of the voters have already decided the election with their respective votes. Nevertheless, just as described above, non-believers weakly prefer voting for NM, so in a sequential version of this game there are subgame perfect equilibria in which at least two of the voters choose NM, and all voters receive s_j. Table 2.1 shows all the described equilibria, pinpointing the pure equilibria for each one of the different settings, as well as the subgame perfect equilibria of the extended version of this game. Proposition 1 draws conclusions from these believers for sure and non-believers for sure mix of cases:

PROPOSITION 1. *Consider the cases in which there exist two types of voters, B and A, such that* $b_{Bi} \leq s_{Bi}$ *and* $\pi_{Bi} = 1 \; \forall \; i \in B$, *and* $b_{Ai} \leq s_{Ai}$ *and* $\pi_{Ai} = 0 \; \forall \; i \in A$. *Additionally, let P and R be such that* $s_{Bi} + P < b_{Bi} + R$. *Then:*

- *If all players are type* B, *they all vote for* M, *which is the winner of the election, and player* i *receive their second-best payoff,* $b_{Bi} + R$.
- *If the number of B voters is larger than the number of A voters, B voters will always vote for* M, *while A voters are indifferent between voting for* NM *and voting for* M. *Voters B receive* $b_{Bi} + R$, *and voters A receive* b_{Ai}.
- *If the number of A voters is larger than the number of B voters, B voters will always vote for* M, *while at least* $\frac{n+1}{2}$ *of A voters will vote for* NM. *This results in the best possible payoffs for both B and A and voters,* $s_{Bi} + R$ *and* s_{Ai}, *respectively.*
- *If all players are type A, at least* $\frac{n+1}{2}$ *of them vote for* NM, *and each one receives* s_{Ai}.

Table 2.1. Equilibria of benchmark cases

<table>
<tr><td colspan="6">All players are believers for sure</td></tr>
<tr><td colspan="3">Player 3 votes M</td><td colspan="3">Player 3 votes NM</td></tr>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td></tr>
<tr><td>Votes M</td><td>Votes NM</td><td>Votes M</td><td>Votes NM</td></tr>
<tr><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1 + R^{**}$,
$b_2 + R^{**}$,
$b_3 + R^{**}$</td><td>$b_1 + R^{**}$,
$b_2 + P$,
$b_3 + R^{**}$</td><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1 + R^{**}$,
$b_2 + R^{**}$,
$b_3 + P$</td><td>$s_1 + R^{**}$,
$s_2 + P$,
$s_3 + P$</td></tr>
<tr><td>Votes NM</td><td>$b_1 + P$,
$b_2 + R^{**}$,
$b_3 + R^{**}$</td><td>$s_1 + P$,
$s_2 + P$,
$s_3 + R^{**}$</td><td>Votes NM</td><td>$s_1 + P$,
$s_2 + R^{**}$,
$s_3 + P$</td><td>$s_1 + P$,
$s_2 + P$
$s_3 + P$</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">Players 1 and 2 are believers for sure and player 3 is a non-believer</td></tr>
<tr><td colspan="3">Player 3 votes M</td><td colspan="3">Player 3 votes NM</td></tr>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td></tr>
<tr><td>Votes M</td><td>Votes NM</td><td>Votes M</td><td>Votes NM</td></tr>
<tr><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1 + R^{**}$,
$b_2 + R^{**}$
$b_3{}^{*}$</td><td>$b_1 + R^{**}$,
$b_2 + P$
b_3</td><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1 + R^{**}$,
$b_2 + R^{**}$,
$b_3{}^{**}$</td><td>$s_1 + R^{**}$,
$s_2 + P$
s_3</td></tr>
<tr><td>Votes NM</td><td>$b_1 + P$,
$b_2 + R^{**}$
b_3</td><td>$s_1 + P$,
$s_2 + P$
$s_3{}^{*}$</td><td>Votes NM</td><td>$s_1 + P$,
$s_2 + R^{**}$,
$s_3{}^{*}$</td><td>$s_1 + P$,
$s_2 + P$,
$s_3{}^{*}$</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">Player 1 is a believer for sure and players 2 and 3 are non-believers</td></tr>
<tr><td colspan="3">Player 3 votes M</td><td colspan="3">Player 3 votes NM</td></tr>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td></tr>
<tr><td>Votes M</td><td>Votes NM</td><td>Votes M</td><td>Votes NM</td></tr>
<tr><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1 + R^{**}$,
$b_2{}^{*}$,
$b_3{}^{*}$</td><td>$b_1 + R^{**}$,
$b_2{}^{**}$,
b_3</td><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1 + R^{**}$,
b_2,
$b_3{}^{**}$</td><td>$s_1 + R^{**}$,
$s_2{}^{**}$,
$s_3{}^{**}$</td></tr>
<tr><td>Votes NM</td><td>$b_1 + P$,
b_2,
b_3</td><td>$s_1 + P$,
$s_2{}^{**}$,
s_3</td><td>Votes NM</td><td>$s_1 + P$,
$s_2{}^{*}$,
$s_3{}^{**}$</td><td>$s_1 + P$,
$s_2{}^{**}$,
$s_3{}^{**}$</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">All players are non-believers</td></tr>
<tr><td colspan="3">Player 3 votes M</td><td colspan="3">Player 3 votes NM</td></tr>
<tr><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td><td colspan="2" rowspan="2"></td><td colspan="2">Player 2</td></tr>
<tr><td>Votes M</td><td>Votes NM</td><td>Votes M</td><td>Votes NM</td></tr>
<tr><td rowspan="2">Player 1</td><td>Votes M</td><td>$b_1{}^{*}$,
$b_2{}^{*}$,
$b_3{}^{*}$</td><td>b_1,
$b_2{}^{**}$,
b_3</td><td rowspan="2">Player 1</td><td>Votes M</td><td>b_1,
b_2,
b_3</td><td>$s_1{}^{*}$,
$s_2{}^{**}$,
$s_3{}^{**}$</td></tr>
<tr><td>Votes NM</td><td>$b_1{}^{**}$,
b_2,
b_3</td><td>$s_1{}^{**}$,
$s_2{}^{**}$,
$s_3{}^{*}$</td><td>Votes NM</td><td>$s_1{}^{**}$,
$s_2{}^{*}$,
$s_3{}^{**}$</td><td>$s_1{}^{**}$,
$s_2{}^{**}$,
$s_3{}^{**}$</td></tr>
</table>

Note: Best responses of the voting game marked with stars. Best responses that are also sincere voting marked with double stars. Shaded squares are pure Nash equilibria.

Notice that the best outcome for a believer (in Proposition 1 labeled as a type B voter) is to be a minority among a majority of non-believers. That way, they can support the candidate preferred by the monitor–associated with an exogenous reward–while also enjoying the electoral result that yields the highest payoff for all voters.

Gambling with votes and rewards

Now I explore those cases for which voters are not completely sure about their beliefs of receiving an exogenous incentive, that is when for voter i, $0 < \pi_i < 1$. Since there is an infinite number of values in the range between zero and one, which yields an infinite combination of voters with different beliefs, I limit this analysis to some special cases. Let the values of π_i vary within the bounds of zero and one, and $b_i \leq s_i$, $s_i + P < b_i + R \; \forall \; i$, where $i = (1, \dots, n)$. Note from the utility function described in the setup of the game that the payoffs of voter i from choosing NM are decreasing in π_i. Conversely, her payoffs from voting for M are increasing in π_i. This means that voter i's payoffs ranking is either:

$$b_i + \pi_i P \leq s_i + \pi_i P < s_i + \pi_i R$$

or,

$$b_i + \pi_i P < b_i + \pi_i R \leq s_i + \pi_i R$$

All the payoffs cannot be included in a single ranking since π_i affects the values of $s_i + \pi_i P$ and $b_i + \pi_i R$ in such a way that it is not possible to determine which value is larger without knowing the distance $s_i - b_i$ and what π_i is equal to. However, it is possible to determine a threshold for π_i so that if its value is above that threshold, the payoff ranking of voter i will be the same as a believer for sure voter. Consider the equality given below, and note that solving it for π_i yields this threshold:

$$s_i + \overline{\pi}_i P = b_i + \overline{\pi}_i R$$
$$\overline{\pi}_i P - \overline{\pi}_i R = b_i - s_i$$
$$\overline{\pi}_i (P - R) = b_i - s_i$$
$$\overline{\pi}_i = \frac{b_i - s_i}{P - R}$$

The ratio of the distance between b_i and s_i to the size of the incentive given by the difference between R and P is the threshold of belief, $\overline{\pi}_i$. When voter's i belief, π_i, exceeds this threshold, she will behave as a believer for sure and will always vote for M. This happens because when $\pi_i > \overline{\pi}_i$ voter i's payoffs ranking order is the same as that of a believer for sure. This is the basis of the second proposition:

PROPOSITION 2. *If* $b_i \leq s_i$ *and* $s_i + P < b_i + R$*, for all voters* i*, there exists a threshold* $\overline{\pi}_i = \frac{b_i - s_i}{P - R}$ *such that for any* $\pi_i > \overline{\pi}_i$*,* i *always votes for* M *with an expected utility of* $\mathbb{E}(u_i) = q(s_i + \pi_i R) + (1 - q)(b_i + \pi_i R)$ *where* q *is the probability that at least* $\frac{n+1}{2}$ *other* j *voters,* $i \neq j$*, choose* NM*, and its complement* $1 - q$ *is the probability that at least* $\frac{n-1}{2}$ *other* j *voters,* $i \neq j$*, choose* M*.*

Figures 2.1, 2.2, and 2.3 offer a graphic representation of this proposition. The curves in these plots correspond to the threshold of belief ($\overline{\pi}_i$) for different values of the size of the incentive offered to voter i ($P - R$), and the difference between the benefits that this voter associates with each candidate winning the election ($b_i - s_i$). As these plots show, the intuition behind this proposition is that once a voter's belief that they will get a high enough incentive from the monitor, they behave no differently from a voter who believes for sure that they will receive the monitor's promised incentive. The threshold above which a voter acts this way, $\overline{\pi}_i$, is decreasing in R and in $|P|$. In other words, all else constant, as the size of the exogenous incentive increases, the belief that the voter needs to have about receiving this incentive to behave in the same fashion as a believer for sure decreases.

Additionally, the value of the threshold $\overline{\pi}_i$ increases as the distance between b_i and s_i gets larger. Hence, if the payoff from the monitor's non-preferred option winning the election is significantly higher than the payoff from the monitor's preferred option winning the election—keeping R and P constant—voters will require to assign a higher degree of belief of receiving the promised exogenous incentive from the monitor to behave as believers for sure.

Now, if voter i has a $\pi_i < \overline{\pi}_i$ it cannot be concluded that i will behave like the exact opposite as when $\pi_i > \overline{\pi}_i$. Thus, voter i does not act as a non-believer in this case. This is because voter i still assigns a weight to P and R, which results in the following payoffs ranking order:

$$b_i + \pi_i\, P < b_i + \pi_i\, R < s_i + \pi_i\, P < s_i + \pi_i\, R$$

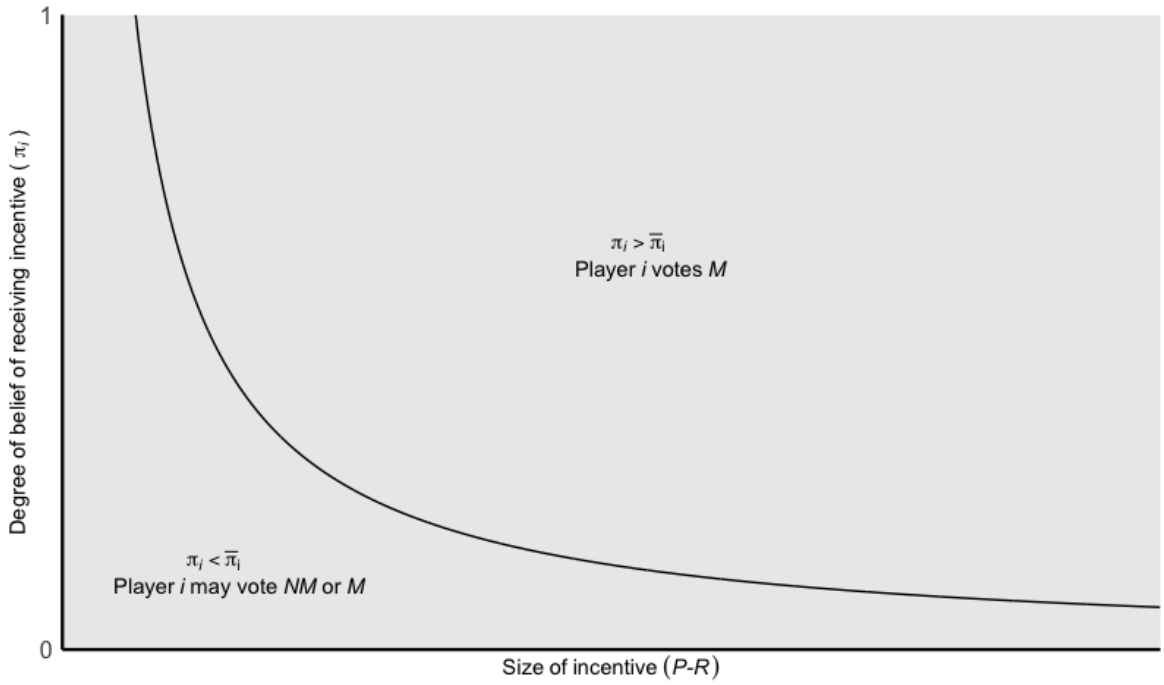

Figure 2.2. Proposition 2: Threshold of belief and size of incentive
Note: All else equal, as the size of the incentive increases, the threshold of belief decreases following a multiplicative inverse function.

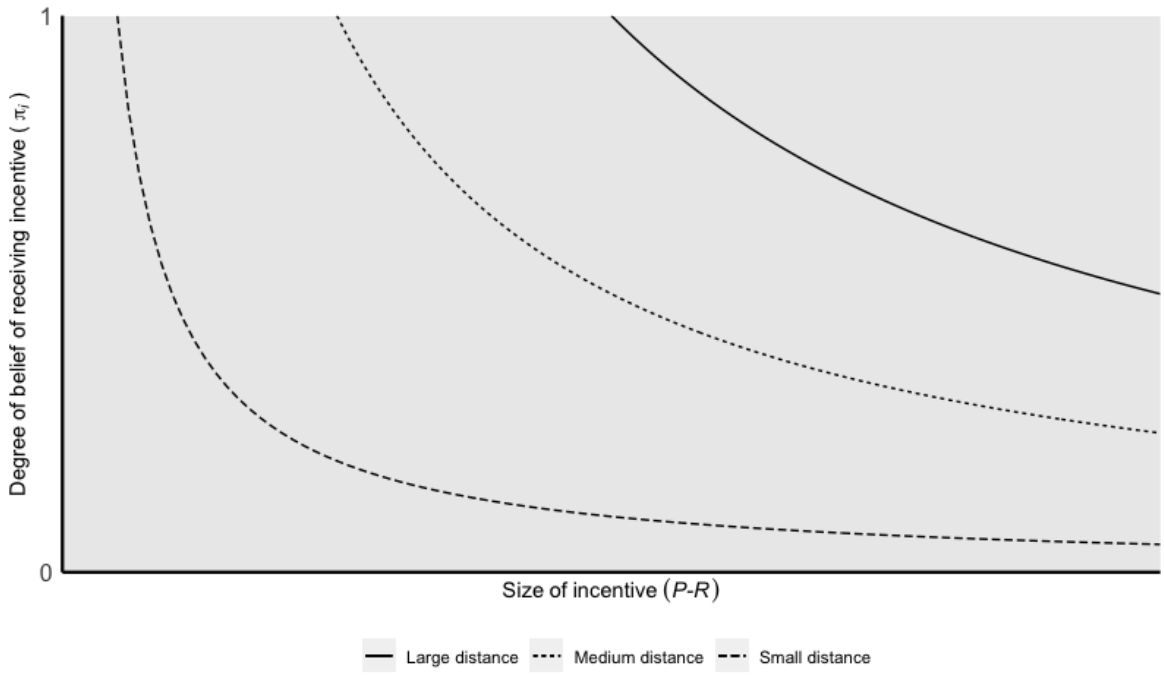

Figure 2.2. Proposition 2: Threshold of belief, size of the incentive, and distance between candidates.
Note: The distance between candidates affects how much the threshold of belief changes when the size of the incentive change

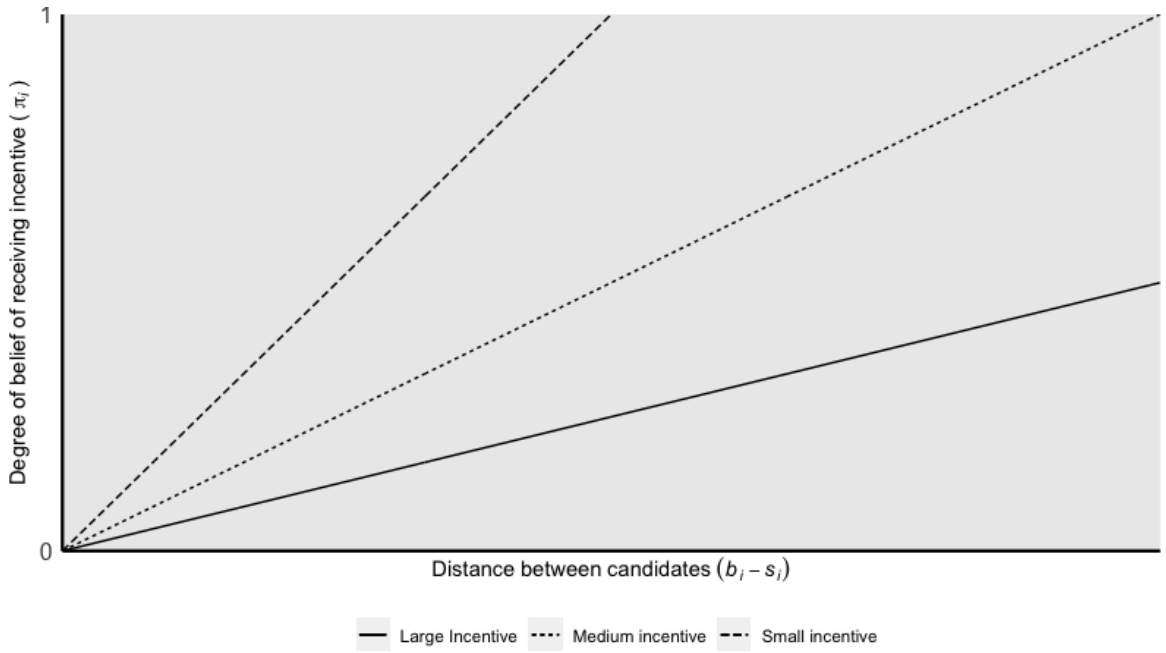

Figure 2.3. Proposition 2: Threshold of belief and distance between candidates.
Note: As the distance between candidates increases, the threshold of belief increases following a linear function. The size of the incentive affects how much the threshold of belief changes when the distance between candidates change.

In this case, voter i is better off whenever NM is the winner of the election, nevertheless if she would know that $\frac{n+1}{2}$ other voters have already voted in favor of NM, she would vote for M to obtain an additional payoff equal to $\pi_i R - \pi_i P$. This extra payoff comes from the probability of avoiding a punishment from the monitor while obtaining a probable reward for supporting the monitor's option. Hence, the game is now similar to a public goods game in which voter i, with a belief π_i in the range $0 < \pi_i < \overline{\pi}_i \leq 1$, has an incentive to deviate and vote for M, taking
advantage of all other j voters, $i \neq j$, with a π_j in the range $0 \leq \pi_j < \overline{\pi}_j \leq 1$ and who have voted for their preferred electoral option, NM. This means that if i knows their vote is pivotal, voter i will vote for NM, and M otherwise.

For the sake of simplicity, consider the scenario in which $n = 3$; if π_i is in the range $0 < \pi_i < \overline{\pi}_i \leq 1$ for all voters i and $i = (1, 2, 3)$, then there exist four pure equilibria. In none of those equilibria, all voters choose option NM. Three of them are the possible combinations of one voter choosing M, and the rest of the voters voting for NM. The payoffs of this equilibria are $s_i + \pi_i R$ for the voter who votes for M; and $s_i + \pi_i P$ for the

voters who choose NM. The other equilibrium consists of all voters choosing M and each of them receiving payoff $b_i + \pi_i R$. Under these conditions, the voters are not indifferent between choices since they all prefer that NM win the election, but whenever they are not pivotal, it is in their best interest to support M. Thus, voter i has a mixed strategy which depends on the probability of being pivotal. This is the core of the next proposition.

PROPOSITION 3. *Let θ denote the probability of voter i being the pivotal voter and let $\pi_i < \overline{\pi}_i$. Then, there exists a threshold $\overline{\theta_i} = \frac{\pi_i (P-R)}{b_i - s_i}$ such that if $\theta < \overline{\theta_i}$ voter i will vote for M, and if $\theta > \overline{\theta_i}$ voter i will vote for NM.*

The proof of this proposition can be found in the appendix; nevertheless, the intuition behind this proposition is relatively simple. If a voter perceives that there is a low probability that they will decide the election with their vote, they will vote for M. If NM wins, this voter would receive her maximum payoff. Further, if M wins the election, there is only a minimal probability that this particular vote would have changed the election's outcome, so the voter is playing it safe in hopes of getting a reward while avoiding their worst possible outcome. Now, considering that in large elections, the probability of being the pivotal voter approximates zero, this proposition would suggest that as long as the voter believes that there is a non-zero probability that they will receive the promised incentive, they will vote for M. Under this scenario, even if plenty of voters do not believe they will receive an incentive ($\pi_i = 0$), vote-selling would be rampant. Hence, this appears to be an unrealistic conclusion. It could be possible to invoke prospect theory and argue that voters are not good at calculating their probability of being pivotal (Kahneman 2003). In this vein, Levine and Palfrey show via a series of experiments that voters tend to overestimate their probability of being pivotal (2007). Nonetheless, the size of the electorate in these experiments never exceeded fifty-one voters. Therefore, it is not possible to conclude that in large electorates, the miscalculation would be so big that it would make the voter act as if they were to cast the decisive vote.

So, does pivotality matter at all? To answer this question, it is necessary to refer to the turnout model proposed by Edlin, Gelman and Kaplan (2007). This model shows that

when voters consider the social benefits of their vote choice, the probability of casting the decisive vote still matters, even when it is close to zero in a large electorate. Thus, it is possible to implement the same logic these authors use to prove that even with a low probability of pivotality, voters would not always vote for M.

First, let both s_i and b_i include individual and perceived social benefits. The perceived social benefits would affect a population of size N. Therefore,

$$s_i = s_{selfi} + \alpha_i N s_{soci}$$

and

$$b_i = b_{selfi} + \alpha_i N b_{soci}$$

Edlin, Gelman and Kaplan define α as "a discounting factor to reflect that benefits to others are less important than benefits to self; thus, we would expect $\alpha < 1$ for most people" (2007, p. 296). It is crucial to mention that the social benefits in this equation are the social benefits that the voter perceives others will receive from the candidate. Thus, these parameters should not be interpreted as the actual benefits that others would receive. Finally, a voter is defined as selfish if $\alpha_i = 0$ and social when $\alpha_i > 0$ (Edlin, Gelman and Kaplan 2007).

Next, the probability of casting the decisive vote can be defined as:

$$\theta = K/n$$

Where K represents the competitiveness of the election (Edlin, Gelman, and Kaplan 2007)[5] and n is the number of voters in the election. The authors state that $K = 10$ is a reasonable representation of an election that is expected to be close. They illustrate this claim with the following example:

> …if a Democrat is running against a Republican, and the difference between the two candidates' vote shares is expected to be in the range ±10%, then the probability is about $1/(0.2n) = 5/n$ that a single added vote could create or break a

[5] Edlin, Gelman and Kaplan offer a thorough explanation for this definition for the probability of being pivotal on the appendix of their paper. Nevertheless, the main point of their explanation can be summarized in the following quote:
Let $f(d)$ be the predictive or forecast uncertainty distribution of the vote differential d (the difference in the vote proportions received by the two leading candidates). If n is not tiny, $f(d)$ can be written, in practice, as a continuous distribution (e.g., a normal distribution with mean 0.04 and standard deviation 0.03). The probability of a decisive vote is then half the probability that a single vote can make or break an exact tie, or $f(0)/n$. (2007, p. 309).

> tie.…if an election is expected ahead of time to be close it is hard to imagine a forecast vote differential more precise than ±2%, in which case the probability of a decisive vote is still at most $1/(0.4n) = 25/n$. In practice, we see $10/n$ as a reasonable approximate probability of decisiveness in close elections. (Edlin, Gelman and Kaplan 2007).

Now, from Proposition 3, it is possible to express the probability of pivotality that yields the indifference point of voter i–when voter i with $\pi_i < \overline{\pi_i}$ expects the same utility from choosing either M or NM–as follows:

$$\frac{K}{n} = \frac{\pi_i(P-R)}{\left(b_{selfi} + \alpha_i N b_{soci}\right) - \left(s_{indi} + \alpha_i N s_{soci}\right)}$$

Next, I do an algebraic rearrangement to get

$$\frac{[\left(b_{selfi} - s_{selfi}\right) + \alpha_i N(b_{soci} - s_{soci})]K}{n} = \pi_i(P-R)$$

which can also be expressed as:

$$\left[\frac{b_{indi} - s_{indi}}{n} + \frac{\alpha_i N(b_{soci} - s_{soci})}{n}\right] K = \pi_i(P-R)$$

Note that as the number of voters (n) increases, the first term approaches zero, such that[6]:

$$\frac{b_{indi} - s_{indi}}{n} + \frac{\alpha_i N(b_{soci} - s_{soci})}{n} \approx \frac{\alpha_i N(b_{soci} - s_{soci})}{n}$$

Thus, the probability of pivotality that yields the indifference point of voter i can be expressed as:

$$\frac{K}{n} = \frac{\pi_i(P-R)}{\alpha_i N(b_{soci} - s_{soci})}$$

This equality is the basis for Proposition 4:

PROPOSITION 4. *Let $\frac{K}{n}$ be the probability of voter i being the pivotal voter. Additionally, let $s_i = s_{selfi} + \alpha_i N s_{soci}$ and $b_i = b_{selfi} + \alpha_i N b_{soci}$. Finally, let $\pi_i < \overline{\pi_i}$.*

[6] It is important to mention that $N \geq n$, since the number of voters is a subset of the total population affected by the results of the election. Further, while it may not be impossible to find a scenario where $N = n$, in most large elections this is improbable. Now, even in this unlikely case, the second term would only be reduced to $\alpha_i N(b_{soci} - s_{soci})$..

Then, for elections with a large n, there exists a threshold $\overline{K}_i = \frac{\pi_i(P-R)}{\alpha_i(b_{soci}-s_{soci})}\left(\frac{n}{N}\right)$ such that if $K < \overline{K}_i$, voter i will vote for M, and if $K > \overline{K}_i$, voter i will vote for NM.

Figures 2.4 and 2.5 display a visual representation of the predictions from this proposition. There are two essential things to note. First, the term n/N acts as a scaling parameter that indicates the ratio of voters in the election per the number of people affected by the election's outcome. The intuition behind this parameter is that as this ratio gets larger, more voters are involved in deciding the fate of the people affected by the election's outcome. Hence, a low ratio means that voter i has a more decisive role over the fate of those affected by the election. This means that, in such a case, voter i will be less likely to be dissuaded by an exogenous incentive. In other words, the vote of i will become more valuable or expensive.

Next, notice that this decision threshold is not expressed as the probability of casting the decisive vote in the election but as the competitiveness of the election. This parameter seems more intuitive and realistic when considering how voters make their decisions. While not many voters–including those that consider the social benefits of their

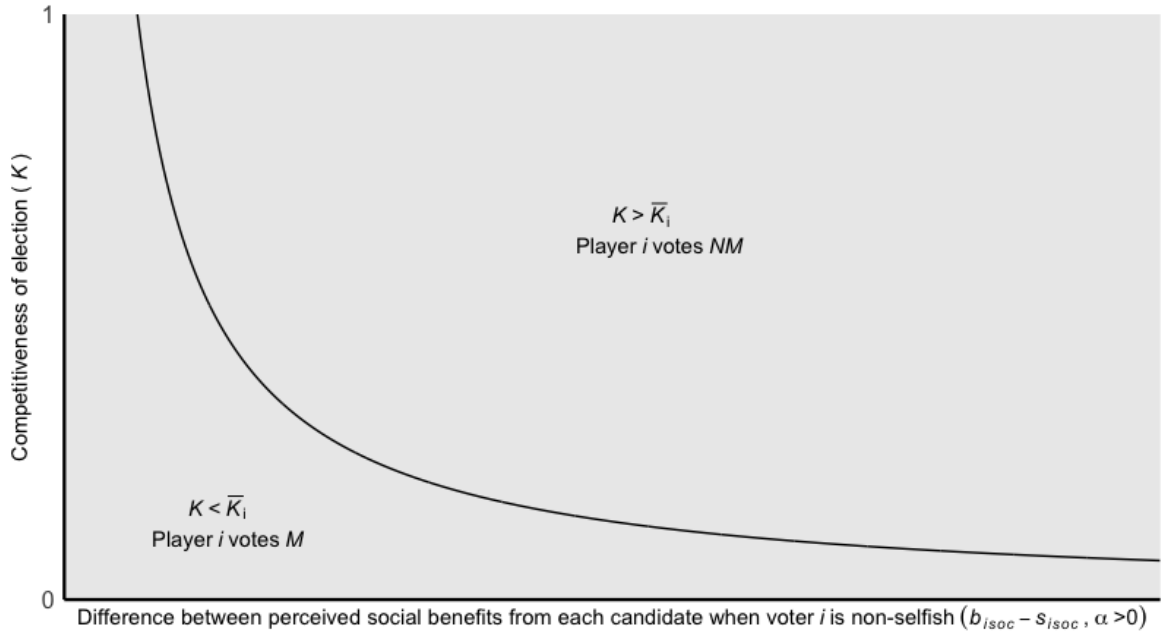

Figure 2.4. Proposition 4: Threshold of competitiveness and difference between perceived social benefits from each candidate.
Note: All else equal, as the difference between perceived social benefits increases, the threshold of pivotality decreases following a multiplicative inverse function.

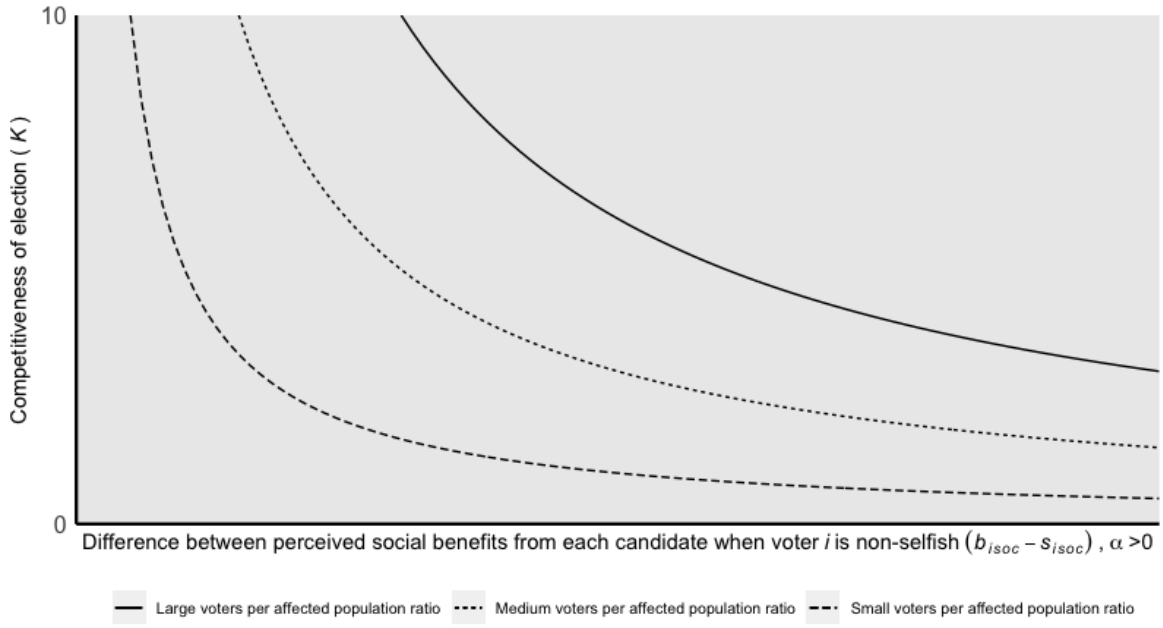

Figure 2.5. Proposition 4: Threshold of competitiveness, difference between perceived social benefits, and voters per affected population ratio
Note: The ratio of voters per affected population affects how much the threshold of competitiveness changes when the difference between perceived social benefits from each candidate changes.

vote– may stop to calculate their probability of pivotality, it is not unreasonable to expect that they are aware of how competitive an electoral race is. Further, following this logic, even if voters do not think about the scaling parameter n/N *per se*, it is reasonable to claim that being aware of the type of election, its importance, and the level of participation expected in this type of election acts as a proxy for this parameter.

The logic behind this proposition is consistent with the findings of White and Laird in their thorough study of African-American voting behavior (2020). In one of their studies, they find that while linked fate–a measure that can be a proxy for expected social benefits–influences voting behavior, this influence is independent of the threat of social punishment (White and Laird 2020). Hence, voters can be affected by exogenous incentives–like social punishments–while, at the same time, considering the perceived social benefits associated with each candidate. Note that linked fate might be an imperfect proxy for social voting since it focuses on in-group benefits (Dawson 1994). However, even if a social voter

concentrates mainly on their in-group, this will only imply that the parameter N must be reweighted[7]. Nevertheless, this reweighting would not alter the logic behind Proposition 4.

Scope of this voting game

It is important to note that this game focuses on the behavior of voters when they face exogenous incentives conditional on their vote choice. Mainly, the game shows the decisions of a voter as the best strategic response to how their fellow voters may behave. Thus, the monitor is not included as a player in this game. However, the influence of the monitor is factored in within the value of the parameters R, P, and partially in π_i. Parameter π_i represents the belief that the voter has that they might receive the promised incentive. Hence, it is a function of elements[8] like the credibility of the monitor that offers the incentive, which in turn can be affected by past experiences of the voter with this monitor. Additionally, this parameter could be influenced by the perceived capacity of the monitor. Only when voters think the monitor can credibly observe their voting behavior will they change that behavior to receive–or avoid–the promised incentive (Rueda 2017; Stokes 2005; Heckelman 1995).

Another important factor that can impact the π_i parameter is the resources available to the party that offers the incentives. If voters perceive that the monitor does not have enough resources to meet the promised incentives, their perception that they will receive this incentive will naturally decrease. Having a large enough budget to deliver rewards or punishments is crucial for the credibility of the monitor (Cruz 2019; Calvo and Murillo 2004). For instance, if the monitor does not have access to government funds or positions to reward voters, or if political legislation and culture change in a way that makes it harder to punish defectors, voters may think that the monitor's promises are not credible. Now, when

[7] An example of this reweighting could be expressed as $N = \delta N_{ingroup} + \gamma N_{outgroup}$ where usually $\delta \geq 1$ as people may be more aware of the size of their group, or even overestimate the affected people in their ingroup. Meanwhile, $\gamma \leq 0$ as some voters may underestimate the size of the outgroup. This example is only meant to illustrate how a concept like linked fate does not negate the validity of the parameter since this parameter can be weighted in a way that it considers different types of social voting.

[8] In future works this model could be extended and explicitly include this function to further theorize about how parameter π_i changes as voters face subsequent elections. Further, such a model could include the monitor as a player, as their actions affect the belief that voters have of receiving the promised incentives. For this theoretical work, it suffices to just focus on the behavior of voters as they face exogenous incentives.

it comes to immaterial incentives, the credibility of the monitor to both observe the voter's behavior and deliver the incentive is still crucial. However, it is essential to note that the perceived resources available to meet the promised incentives are more ambiguous and, in a way, less constrained. For example, when a social group acts as the monitor, and the voter's incentives are social acceptance or ostracism, the voter has no easy way to determine the resources available to the social group to punish or reward them. Similarly, when it comes to religious incentives, a voter may believe that a supernatural monitor may have access to an unlimited budget.

Cases of exogenous incentives as conditioners of voting behavior

I now illustrate the predictions from the model with three different cases where exogenous incentives have been used to alter voting behavior. The first case focuses on material incentives, like vote-buying, while the other two show examples of immaterial incentives as tools for conditioning vote-choice.

The Gilded Age and the Progressive Era: Vote-buying and changing voters' incentives in the USA

Voting during the Gilded Age in the United States illustrates the dynamics of the voting game at work. The machine party politics created during the era of Jacksonian democracy spurred a democratic system characterized by patronage, clientelism, coercion of voters, and electoral fraud that endured until the late 1800s and in some places up until the early 1900s (Argersinger 1985; Harris 1934). The incentives present during this era of American party politics can be mirrored by the game's parameters and the strategic behavior of voters predicted by the model. The first thing to note is that, despite the ideal of democracy, a considerable number of voters did not have a clear political preference in mind, and they were not showing up to the voting booth moved by a sense of civic duty either. Instead, they were motivated by exogenous incentives like patronage benefits, vote-buying, or avoiding physical punishment (Argersinger 1985; Heckelman 1995). In the voting game, this scenario mirrors the case when the difference between the parameters s_i and b_i is not large (because these voters did not have any clear political preferences), and the size of the incentives ($P - R$) can be large enough to determine voting behavior.

An active electoral market existed in which voters and parties were willing to exchange money for votes. In Connecticut, for instance, votes were sold at prices that ranged from two to twenty dollars, and around 20,000 votes were being sold in some elections (McCook 1892); while in New York, there is evidence of an election where about 170,000 vote sellers were paid five dollars[9] each (Speed 1905). Additionally, in the reports that Joseph Harris cites to illustrate vote fraud after the Civil War, bribery is one of the issues that is usually mentioned (1934). Hence, a non-trivial number of voters would gladly respond to a reward in exchange for their vote. This means that the incentives were high enough to influence voters' behavior in favor of the party monitor's preferences. Not surprisingly, with low partisan preferences and large enough incentives, vote-selling and vote-buying were ubiquitous. This dynamic was especially salient in cities with strong party machines like Chicago, New York, or Cincinnati, since these machines could credibly signal to voters that their behavior was being monitored (Gosnell 1924; Gosnell 1937; Gosnell 1933; Allen 1993). After all, before the introduction of the Australian ballot, parties printed their own ballots so they were easily identifiable. Therefore, voters were aware that party members were observing their voting behavior, and only those highly partisan voters would invest in the additional effort of hiding their vote from the monitor or voting a split ticket (Heckelman, 1995; Rusk, 1970).

Because of this combination of factors–the low partisan identity of many voters, large incentives, and high perceptions of being monitored–this society seemed locked in a "bad" equilibrium vote-selling was the norm. So, how did the US electoral system escape this equilibrium? The answer lies in the introduction of the Australian ballot and the reform of the Civil Service brought about by the Pendleton Act. These reforms restructured the incentives from the Gilded Age by affecting the credibility of those who had previously distributed material incentives among voters. In short, the Pendleton Act of 1883 restricted a party's access to the purse by limiting its influence over the Civil Service and prohibiting mandatory campaign contributions. Hence, without access to the resources that the party machines had in the past, their credibility to deliver the promised incentives in an election

[9] Consider that one dollar in 1880 is equivalent to about twenty-nine dollars in 2023 after adjusting for inflation. This means that, if McCook's accounts are accurate, some voters in Connecticut could have received up to five hundred and eighty 2023 dollars for their vote.

was diminished (Hoogenboom 1959), and voting behavior seemed to adapt accordingly (Rusk 1970).

While the Pendleton Act reduced the access to resources that could be used for patronage or vote-buying, the Australian ballot contributed to lowering the monitoring abilities of political machines. The main feature of the Australian ballot is that it makes voting effectively anonymous. To achieve this secrecy, this ballot must be printed exclusively by the government, it must contain all the candidates and proposals to be voted on, it can only be distributed at the polling site, and it must be marked in the privacy of the voting booth. This was a significant shift from how voting had been done during the Gilded Age, and it was accompanied by a corresponding shift in voting behavior, as ticket splitting increased and turnout decreased (Rusk 1970; Heckelman 1995). The Australian ballot reduced the credibility of parties regarding their ability to monitor and, therefore, reward or punish voters. Further, Reed shows that the Australian ballot also made voting costlier, as it imposed information constraints on voters (Reed 2014). Thus, incentivizing voters to support a particular party and monitoring their behavior became a costlier task. At the same time, the parties could not freely access public resources and the spoils of office to finance their party machine activities.

It is important to note that, even if it officially implemented the Australian ballot, the US South did not grant voters' secrecy (Key 1949; Reed 2014). An example of this was how Arkansas required voters to sign a carbon copy of their vote (Reed 2014). Hence, the Southern Democrats used incentives like voter intimidation or vote-buying to curb voting behavior in the region well into the twentieth century (Harris 1934; Key 1949). The party in power could still credibly signal to voters that it would deliver the promised incentives to voters, be them positive or negative. Additionally, Southern Democrats also heavily relied on voter suppression tactics like poll taxes or voter literacy laws; however, those electoral practices–while substantially important–go beyond the scope of the theory presented in this article.

Social groups and immaterial incentives: African-American electoral behavior

An illustration of the dynamics of the voting game, when voters face immaterial incentives, can be observed in the African-American community. In their extensive study of

African-American electoral behavior, White and Laird show that this racial group has developed a partisan identity that goes hand-in-hand with their group identity. This is reflected in the fact that a little more than 80% of African-Americans self-identify as Democrats. This link between political and racial identity is so strong that reneging on this partisan identity is perceived as an affront to the group (White and Laird 2020). The authors argue that African Americans' partisan identity and political behavior are conditioned by a social norm that establishes that their ethnic identity is closely tied to their political preferences. In other words, identifying as an African American implies that one ought to support the Democratic Party. Hence, the expressed partisan identity of some members of this ethnic group does not reflect the person's actual ideological and partisan preferences. These group members are coerced by negative social incentives and group monitoring to identify with the groups' preferred political party and cast their votes accordingly (White and Laird 2020). This social phenomenon is in line with the behavior predicted by the voting game described above. The social group acts as a monitor that curbs the partisan identity of individuals who belong to that group. Further, as the model would predict, White and Laird's research shows that when the social group influence is stronger—measured as the number of ties a person has with other people from the same group—the likelier it is that a person will express a party identity or display a political behavior that aligns with that of the group (2020). That is, a dense social network within the racial group increases the perception of potentially receiving the exogenous incentive (π_i in the voting game), and this incentive is the threat of social punishment of ostracism (P in the voting game).

The authors also conducted a set of experiments where African-American individuals were put in a position of a cross-pressured voter, where their individual preferences could be contrary to the group norm. In the voting game, this would represent an increase of the distance between s_i and b_i. Further, in these experiments, the researchers manipulated the perception of being monitored (White and Laird 2020). Again, their findings mirror the predictions made by the theory presented in the section above. These individuals would follow the group norm of political behavior; nevertheless, as their decisions became more decisive, they would be more willing to accept the potential social punishment and act according to their personal preferences. This conduct echoes

propositions 3 and 4 of the voting game. Finally, this behavior was mediated by the perceptions of being monitored by a peer from their racial group. All else equal, individuals were less likely to go against the group norm when they felt that someone from their racial group could observe their behavior (White and Laird 2020).

It is important to note that while some of this electoral behavior could be explained by individuals being social voters–those that consider both their preferences along with those of the group in their electoral behavior–the authors show that prosocial behavior does not fully explain the vote choice and party identification of many members of this group (White and Laird 2020). In other words, for a significant amount of people within this group, the social norm, its associated punishment, and group monitoring are the determinant factors of their voting behavior.

While the case of African-American political behavior seems like a prime–and maybe *ad hoc*–example to illustrate the predictions of the voting game, it should be noted that there are other cases in which social group monitoring and social punishments have been observed to be determinants of voting behavior. Cesi Cruz, for instance, finds that in the Philippines, social networks are essential elements in vote-buying transactions. Social networks can act as monitors and enforcers when voters renege on their vote-selling deal when casting their vote (Cruz 2019). It is noteworthy that the case studied by Cruz presents a mix of material rewards and immaterial punishments.

Religious voting and immaterial incentives: supernatural incentives and monitoring

Some religious political behavior could be understood as an incentive structure that conditions the payoffs individuals believe they will receive depending on their political choices. For example, religious beliefs are sometimes associated with punishment or rewards offered and enforced by a supernatural entity depending on a person's political preferences. Hence, a religious voter may alter their voting behavior depending on their belief that their choice goes against the one preferred by the supernatural entity and if they associate a large incentive from this entity depending on the voter's electoral choice. This can mean that some voters may be pushed to support candidates that do not align with their intrinsic preferences but are seen as the pious choice in their religious worldview. Now, this scenario is more than mere speculation, as there seems to be a growing number of cases of

priests and churches in the US openly speaking against Democratic candidates and the Democratic party (Schwartz and Priest 2022; Byrd 2022). Further, in some cases, there have been reports of churches telling their parishioners that supporting the Democratic party would lead them to hell or that it is incompatible with the Christian faith (Stewart 2016; Benen 2022; Anglesey 2022). In cases like these, the religious incentives correspond to parameter P in the voting game. Similarly, the degree of faith, along with the trust a person puts in the priests preaching these political messages, are mirrored by parameter π_i in the voting game. Now, while these might be fringe cases, they show that religious incentives can and have been used to change voting behavior. Following the logic of the voting game, these incentives can put voters in a situation akin to the Pascal wager, where voters might choose to play it safe and vote for the pious candidate–especially when they vote in non-competitive districts or elections[10]–to avoid any divine reprimands.

Even when religious voters may not be entirely sure that their electoral behavior will be punished or rewarded, their belief that it could happen would be enough to lead to equilibrium behaviors where voters support the religious option. Further, as Fudenberg and Levine explain in their work about superstition and equilibrium behaviors, these equilibria may persist as long as religious voters associate a negative (or positive) occurrence they experience after the election with a vote they casted against (or in favor of) the pious choice (2006). This mechanism seems to be consistent with the observation that economically disadvantaged religious voters tend to support options that are contrary to their economic interests (Roemer 1998; De la O, and Rodden 2008; Frank 2004). Now, I do not mean to imply that the mechanism of the voting game explains every case of religious individuals voting against their economic interests, but rather propose that religious incentives–be they punishment or rewards–may be dissuading at least some of these voters. In other words, this voting model suggests that this seems to be at least one of the mechanisms at play in this scenario.

[10] An interesting example of religious voters rallying together behind one candidate in a non-competitive election–a low K in the voting game–was observed during the first round of the Peruvian presidential election. In this election, most conservative Catholics and Evangelicals supported Rafael López-Aliaga, even though he did not have a chance to win the election (Armas Asín 2022). This first round election was an opportunity for a lot of these voters to cast a pious vote. Of course, there were voters that supported this candidate as a form of expressive vote, so that they could signal to other politicians their policy preferences, but less politically sophisticated voters may have just been motivated by the incentive structure given by their religious beliefs.

As an example, consider the case of the Latino community in the United States. The topic behind which most Latinos have rallied together during the first and a half decade of the 21st century is immigration. At the federal level, more and more Latinos tend to favor a more open and less discriminatory immigration policy (Morin and Pantoja 2015, Sanchez and Sanchez-Youngman 2015, Preuhs 2015). The current Democratic rhetoric seems to represent what the Latino community stands for regarding this issue. However, religious beliefs might be disrupting Latino support for the Democratic party. According to the Pew Hispanic Center's information, "Latinos who are Evangelicals are twice as likely as those who are Catholics to identify with the Republican Party" (2007).

Moreover, the Pew Hispanic Center also found that: "the Catholic share of the Hispanic population is declining, while rising numbers of Hispanics are Protestant or unaffiliated with any religion" (2014). These findings are particularly interesting when taking into account that Latino Evangelicals have a higher tendency to be involved in church activities or church groups (Pew Hispanic Center, 2007) and that church engagement is associated with higher political participation (Verba, Schlozman and Brady 1995). Therefore, religious incentives might be expected to play a greater role in the voting behavior of evangelical Latinos than in that of Catholic Latinos in the U.S. The tendency to support the Republican Party would seem to respond to these religious incentives (Alberta 2022). Thus, although Latinos seemingly agree on the topic of immigration, religion is a factor that might deter some of them from supporting the party that represents their best interest on this matter; since that same party could also be associated with what religious voters perceive as immoral policies like abortion or same-sex marriage (Alberta 2022). In this case, religion might be an incentive structure that conditions political behavior.

Conclusion

In this article, I have presented a voting model to explain the effects of exogenous incentives–material and immaterial–on voters' electoral choices. Further, the game I use to model this phenomenon considers how voters' decisions are not only influenced by these exogenous incentives; they are also the best responses that consider the choices that the rest of the electorate might make and the competitiveness of the election in general. In short, the voter in this model considers their electoral environment along with the exogenous

incentives. This game's equilibria show that in non-competitive elections, or when voters perceive that it is very likely that they will receive a large enough exogenous incentive, they will tend to alter their voting behavior, even if it means supporting their least preferred electoral option. It could be said that voters who face these incentives play a safe gamble with their vote to maximize their utility.

Even if these conclusions are not groundbreaking, this theoretical model does offer two important contributions to the study of electoral behavior. First, while there are models that explore vote-buying and the influence of exogenous incentives, they have mainly focused on the interaction between parties and voters (Nichter 2008; Stokes 2005; Nichter and Nunnari 2022; Nichter and Peress 2017). The model presented in this paper focuses on the actions of voters as they strategically respond to the behavior of the other voters in the electorate. Further, it considers how the competitiveness of an election contributes to a voter being persuaded by exogenous incentives to change their vote. Second, this voting game models the perception or belief that voters will receive an exogenous incentive. Hence, it considers the possibility that this belief could be associated with immaterial incentives. In such cases, the model can explain how social reprimands or religious beliefs can act as incentive structures that alter voting behavior similar to what is observed in vote-buying transactions. Moreover, these immaterial incentives have the potential to be very persuasive as they do not necessarily rely on a budget, even if they are large. In a way, they can result in superstitious equilibria like those described by Fudenberg and Levine (2006).

It is worth mentioning that this theoretical model does not pretend to explain all scenarios where a voter faces exogenous incentives. Voting behavior is a complex subject, and it would be unwise to ignore that there are other mechanisms at work when voters that have received a promise of an exogenous incentive cast their votes. However, the model shows how the electoral environment and the voters' beliefs are important inputs to consider when trying to understand how exogenous incentives alter voters' decisions. This can be seen in each of the three cases used to illustrate the model's main predictions. For instance, during the Gilded Age, monitoring was inexpensive for parties; voters were aware that the parties could observe their behavior, and the parties offered attractive incentives to manipulate voters' behavior. In addition, many voters did not have strong partisan identities. Consequently, vote-buying and coercion of voters were common practices.

Similarly, White and Laird's thorough work on African-American political behavior illustrates how immaterial incentives, like social punishments and group monitoring, strongly impact electoral behavior. Moreover, their work shows that as the decisions of individuals become pivotal, the likelihood of defecting from the group norm increases (White and Laird 2020). Finally, the case of religious voting illustrates how religious beliefs can be used to offer immaterial supernatural incentives, where the monitor perceived by the voter is associated with a supernatural entity. This puts religious voters that may consider supporting a non-pious candidate in a situation akin to that described in the well-known Pascal Wager.

Finally, future work based on this theoretical model could include different extensions of the voting game, like including the party as a player in a multi-stage version. In it, the party could promise and distribute exogenous incentives among voters. Such a game would allow theorizing about the party's behavior when a budget constrains the incentives and about the behavior of voters that might try to trick the party and still collect the exogenous incentive. Furthermore, in the case of immaterial rewards not constrained by a budget, an extension of this game could include the fact that voters tend to internalize the party and ideological preferences of their social groups (Green, Palmquist and Schickler 2002). In this version of the game, players would play multiple rounds. Every time the voter is persuaded by a social or religious incentive, the personal preferences of the voter are updated for the next round. Hence, eventually, the exogenous incentive may end up changing the intrinsic preferences of the voter to the point where the incentive is not necessary anymore. Additionally, this voting game and its potential extensions warrant a thorough empirical study to examine if they help predict voting behavior beyond those cases presented in this paper.

In the end, because of their potential to hamper the representativeness of elected officials and threaten the legitimacy of democracy, it is essential to develop a more thorough understanding of the consequences of disruptive electoral incentives. This article is a step in that direction.

APPENDIX

Proof of proposition 3

In order to find a threshold of the probability of pivotality above which a voter i will voter for NM, and below which they will vote for M, I first write the expected utilities of the voter for supporting each one of the possible options. For simplicity, assume p is the probability that a voter not i chooses NM over M, and that p is the same for every voter not i. Note that relaxing this assumption does not change the conclusion of proposition 3. Thus, the expected utility of voting for NM of i is:

$$\mathbb{E}\big(\boldsymbol{u_i}(\boldsymbol{v_i} = \boldsymbol{NM})\big)$$

$$= (b_i + \pi_i P)\left[(1-p)^{n-1} + \binom{n-1}{1}p(1-p)^{n-2} + \binom{n-1}{2}p^2(1-p)^{n-3}\right.$$

$$\left. + \cdots + \binom{n-1}{\frac{n-3}{2}}p^{\frac{n-3}{2}}(1-p)^{\frac{n+1}{2}}\right] + (s_i + \pi_i P)\left[\binom{n-1}{\frac{n-1}{2}}p^{\frac{n-1}{2}}(1-p)^{\frac{n-1}{2}}\right]$$

$$+ (s_i + \pi_i P)\left[\binom{n-1}{\frac{n+1}{2}}p^{\frac{n+1}{2}}(1-p)^{\frac{n-3}{2}} + \cdots + \binom{n-1}{n-2}p^{n-2}(1-p)\right.$$

$$\left. + p^{n-1}\right]$$

Whereas the expected utility of i from voting for M is:

$$\mathbb{E}\big(\boldsymbol{u_i}(\boldsymbol{v_i} = \boldsymbol{M})\big)$$

$$= (b_i + \pi_i R)\left[(1-p)^{n-1} + \binom{n-1}{1}p(1-p)^{n-2} + \binom{n-1}{2}p^2(1-p)^{n-3}\right.$$

$$\left. + \cdots + \binom{n-1}{\frac{n-3}{2}}p^{\frac{n-3}{2}}(1-p)^{\frac{n+1}{2}}\right] + (b_i + \pi_i R)\left[\binom{n-1}{\frac{n-1}{2}}p^{\frac{n-1}{2}}(1-p)^{\frac{n-1}{2}}\right]$$

$$+ (s_i + \pi_i R)\left[\binom{n-1}{\frac{n+1}{2}}p^{\frac{n+1}{2}}(1-p)^{\frac{n-3}{2}} + \cdots + \binom{n-1}{n-2}p^{n-2}(1-p)\right.$$

$$\left. + p^{n-1}\right]$$

Note that each expected utility function is formed by three possible payoffs multiplied by two binomial cumulative mass functions (first and third terms) and one binomial probability mass function (second term)[11]. The cumulative mass functions give the probability that at least $\frac{n+1}{2}$ voters select either M (first term) or NM (third term). While the probability mass function gives the probability that voter i is the pivotal voter. To simplify notation let:

$$\boldsymbol{\psi} = \left[(1-p)^{n-1} + \binom{n-1}{1}p(1-p)^{n-2} + \binom{n-1}{2}p^2(1-p)^{n-3} + \cdots + \binom{n-1}{\frac{n-3}{2}}p^{\frac{n-3}{2}}(1-p)^{\frac{n+1}{2}}\right]$$

$$\boldsymbol{\theta} = \left[\binom{n-1}{\frac{n-1}{2}}p^{\frac{n-1}{2}}(1-p)^{\frac{n-1}{2}}\right]$$

$$\boldsymbol{\phi} = \left[\binom{n-1}{\frac{n+1}{2}}p^{\frac{n+1}{2}}(1-p)^{\frac{n-3}{2}} + \cdots + \binom{n-1}{n-2}p^{n-2}(1-p) + p^{n-1}\right]$$

Now I set the two expected utilities for i equal and solve for θ in order to find the threshold of probability of being pivotal, $\overline{\theta_i}$, above which voter i would vote for NM.

$$\mathbb{E}\big(u_i(v_i = NM)\big) = \mathbb{E}\big(u_i(v_i = M)\big)$$

$$(b_i + \pi_i P)(\psi) + (s_i + \pi_i P)(\theta) + (s_i + \pi_i P)(\phi) = (b_i + \pi_i R)(\psi) + (b_i + \pi_i R)(\theta) + (s_i + \pi_i R)(\phi)$$

$$\psi b_i + \psi\pi_i P + \theta s_i + \theta\pi_i P + \phi s_i + \phi\pi_i P = \psi b_i + \psi\pi_i R + \theta b_i + \theta\pi_i R + \phi s_i + \phi\pi_i R$$

$$\psi\pi_i P + \theta s_i + \theta\pi_i P + \phi\pi_i P = \psi\pi_i R + \theta b_i + \theta\pi_i R + \phi\pi_i R$$

$$\theta s_i + \theta\pi_i P - \theta b_i - \theta\pi_i R = \psi\pi_i R + \phi\pi_i R - \psi\pi_i P - \phi\pi_i P$$

$$\theta(s_i + \pi_i P - b_i - \pi_i R) = \pi_i(\psi R + \phi R - \psi P - \phi P)$$

$$\overline{\theta_i} = \frac{\pi_i(R-P)(\psi+\phi)}{(s_i + \pi_i P - b_i - \pi_i R)}$$

Note that if:

$$\theta = \overline{\theta_i}$$

Then,

$$\psi + \phi = 1 - \overline{\theta_i}$$

[11]Assuming that p is a constant probability over all voters not i allows me to express these probabilities as binomial probability functions, so I can be more transparent of where the next terms (which are used in proposition 3) come from. Relaxing the assumption that p is constant over each voter not i does not change how the terms used in Proposition 3 behave, but it would make the process of illustrating what these terms represent more cumbersome.

Thus, the function can be rewritten as:

$$\overline{\theta_i} = \frac{\pi_i \left((R-P)\left(1-\overline{\theta_i}\right)\right)}{s_i + \pi_i P - b_i - \pi_i R}$$

$$\frac{s_i + \pi_i\, P - b_i - \pi_i R}{\pi_i\,(R-P)} = \frac{1-\overline{\theta_i}}{\overline{\theta_i}} = \frac{1}{\overline{\theta_i}} - 1$$

Solving for $\overline{\theta_i}$, the resulting equation is:

$$\overline{\theta_i} = \frac{\pi_i\,(P-R)}{b_i - s_i}$$

Expressing the decision threshold this way eliminates the probability of pivotality parameter on the right-hand side of the equation. Using the rationality approach with this equation, a voter would weakly prefer voting for NM if and only if:

$$\overline{\theta_i} \leq \theta$$

$$0 \leq \theta - \overline{\theta_i}$$

Which is:

$$0 \leq \theta - \left[\frac{\pi_i\,(P-R)}{b_i - s_i}\right]$$

Thus, $\overline{\theta_i}$ is the threshold of probability of pivotality advanced in proposition 3, the indifference point of voter i, where their expected utility from voting any of the two options, NM or M, is the same.

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