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On Ignorant Voters and Busy Politicians

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Abstract

We show that a large electorate of ignorant voters can succeed in establishing high levels of electoral accountability. In our model an incumbent politician is confronted with a large number of voters who receive very noisy signals about her performance. We find that the accountability problem can be solved well in the sense that the incumbent exerts effort *as if* she faced a social planner who receives a perfect signal about her performance. Our results thus shed light on another potential blessing of large electorates in addition to information aggregation as postulated by the jury theorem.

JEL-Codes: D72, D82, H41

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1 Introduction

Elected politicians are responsible for a wide array of policies that affect the well-being of their voters. From a voter's perspective, the ideal incumbent would be competent and she would work hard for the voter's well-being. Accordingly, the political economy literature attributes two different functions to elections: they can serve to select good types of politicians and to discipline incumbents by creating accountability (Besley (2007), Alt et al. (2011)). For both functions, the information an election is based upon is a key element to achieve good outcomes.

However, voters are often questioned whether they have sufficient knowledge and motivation required to successfully evaluate politicians in order to incentivize incumbents and getting rid of incompetent but retaining competent ones (see Ashworth and Bueno de Mesquita (2014) for a discussion). At least since Downs (1957), economists and political scientists have argued that a voter cannot be expected to spend considerable amounts of time in order to grasp complex political and economic issues in depth because their vote will usually hardly matter at all when the electorate is large. So, if voters tend to be relatively ignorant, are elections nothing but a rusty blade in the hand of voters that hardly frightens politicians?

When it comes to selecting talented politicians, the literature offers an elegant solution for the case of large electorates: the jury theorem. Since Condorcet, many studies (see Young (1988), for example) have shown that even if each individual voter has very little knowledge about which alternative is the right choice, the collective decision of a large electorate can be correct in the sense that a perfectly informed social planner would have made the same decision. This result that large groups of voters can collectively make good decisions although individual voters are relatively ignorant is often referred to as a theoretical basis for democracy (see Ladha (1992), for example).

The jury theorem reduces the worries about voters' lack of knowledge and understanding when it comes to selecting good types of politicians. However, it is silent about whether an elected competent politician will indeed work sufficiently in the direction of voters' will. In other words, the jury theorem ignores one of the two main

roles attributed to the elections: to discipline incumbents by creating accountability.

In models on the jury theorem, politicians who are running for office are usually included as parameters and not as strategic players who follow their own agenda. But the strategic interaction between the electorate and politicians is important for political outcomes. For example, an incumbent can have to make a decision on how much costly resources (time, effort, political capital) she is willing to invest in providing a public good or to which extent she should engage in rent-seeking. Then, voters can observe her resulting performance and decide whether or not to vote for her in the next election. By boosting performance the incumbent can try to appear more talented in order to receive more votes. Voters are aware of these incentives and try to correct their observations for the manipulation of the incumbent. The result of this game between incumbent and voters then is an important determinant of policy outcomes and thus voters' well-being.

Ignorant voters, however, will find it hard to isolate the incumbent's contribution to their well-being and thus their observation of performance is very noisy. The opinions of ignorant voters then can hardly be affected by a little boost of performance resulting from the politician's effort. So should we expect politicians to be lazy because they know that the voters have very little understanding of a politician's performance? In this paper, we try to answer this question.

We use a political agency model of the career concern type (see Persson and Tabellini (2002)) with two periods. An incumbent who provides a public good faces a large electorate where each voter has little incentives to pay attention to political issues. As already discussed by Downs (1957), however, we assume that voters receive some bits of information about the incumbent's performance just by living their everyday life. A voter can, for example, experience utility from public goods but she is more or less ignorant about the specific contribution of the incumbent to the total level of public goods. This is modeled as follows: each voter receives for free a very noisy private signal about the incumbent's performance before deciding whether to vote for the incumbent or a challenger.

As usual in this class of models, an incumbent in period 2 will not exert any effort and thus each voter votes for the candidate who appears to be more competent.

The incumbent can try to manipulate the voters' beliefs about her competence by exerting costly effort which boosts performance in public good production. Due to the very noisy signals, however, additional effort has but little effect on the observed performance and thus on the voters' opinions about the incumbent. So the payoff of effort is low regarding this effect. But there is another effect that makes appearing even a little more competent valuable: Although the incumbent's knowledge about the opinion of a randomly drawn voter is very fuzzy, due to the law of large numbers the incumbent has relatively good knowledge about the opinion of the *posterior median voter*. The opinion of the posterior median voter is the median opinion after each voter has received her signal and it determines the decisive vote in the election. When voters are indifferent between the incumbent and a challenger ex ante, then it is very likely that the median voter's opinion is around the threshold for re-election. Thus, it is relatively likely that changing her opinion by exerting more effort can shift the opinion over the threshold. We find that the more precise knowledge of the incumbent regarding the decisive median opinion compensates for the little impact which the incumbent's performance has on a voter's opinion such that the incumbent will exert effort as if she were confronted with a social planner who receives a perfect signal about performance.

Thus, it is possible that a large electorate of almost ignorant voters can establish high levels of accountability. Further, in analogy to the jury theorem, the electoral decision is such that an incumbent who is more competent than average is re-elected with probability one. In summary, when the electorate is large, ignorant voters can enjoy high levels of public goods because incumbents are both: talented and hard-working.

The paper connects two strands of the literature: electoral accountability and the jury theorem. In political economy, the career concerns approach (initiated by Holmström (1999)) is often used to analyze to which degree a politician can be held accountable through re-election pressures.[1] The main idea is that a politician can manipulate

[1]The career concerns model has been used extensively in the political economy literature to study various issues. Ashworth (2005) and Ashworth and Bueno de Mesquita (2008) use the framework to analyze the determinants and consequences of the incumbency advantage. Alesina and Tabellini (2007, 2008) discuss the types of policy tasks better suited for a bureaucrat versus for a politician, whereas Dewatripont et al. (1999) study the organization of government agencies. Gehlbach (2007) compares the incentives of national politicians to provide local public goods in the case of electoral

a voter's perception about her in order to increase her chances of re-election. It is shown in this literature that the precision of the voter's signal about the politician plays a crucial role: The lower the precision, the harder for the politician to influence the voter's perception, and the lower her incentive to work consequently (see Alesina and Tabellini (2007), for example). Hence, it is legitimate to worry about a voter's lack of knowledge or interest. However, this literature considers only a representative voter. In this paper, we study which level of accountability can be established by a large electorate which consists of ignorant voters.

In contrast to the literature on electoral accountability, models concerned with the jury theorem do consider a large number of voters but they focus on the selection problem ignoring the accountability problem. The jury theorem has been formalized by Young (1988) and Ladha (1992) among others. The standard assumptions of the theorem are an infinitely large electorate, the conditional independence of voters' signals, majority voting, and sincere voting. Ladha (1992) studies the robustness of the theorem with respect to correlated signals. Austen-Smith and Banks (1996) shows that sincere voting does not constitute a Nash equilibrium. However, Feddersen and Pesendorfer (1997, 1998) show that this does not create a problem for the jury theorem, since it is robust to strategic voting. They show as well the robustness to supermajority requirements. Martinelli (2006) does not assume exogenously that a voter receives a noisy signal, instead shows that a voter has an incentive to acquire a costly signal in spite of low pivotal probability and that the collective decision can be efficient under some conditions on the cost of information acquisition.

We are bringing together these two strands of the literature in order to evaluate the potential effectiveness of elections from a more comprehensive perspective incorporating both roles of elections: selection and incentives (accountability).

The paper is structured as follows. Section 2 presents the model. Section 3 includes the equilibrium analysis, whereas Section 4 discusses briefly how introducing common noise or ideology alters our main result. Section 5 concludes.

college and majoritarian elections.

2 The Model

We develop a model which allows us to study the incentives of incumbent politicians under circumstances as in standard models on information aggregation (common preferences among voters, sincere voting and private signals). Our model follows the 'career concern' approach of political agency problems as described in Persson and Tabellini (2002).

There are two time periods and a continuum of voters with unit mass. In period 1, there is an incumbent politician (I) who provides a public good. At the end of period 1 an election takes place, where the voters can either re-elect the incumbent or elect a challenger (C) and the winner of the election provides the public good in period 2. The candidate who receives the majority of the votes is the winner. Ties are broken fairly. Before the election, each voter receives a private signal about the incumbent's performance.

2.1 Public Good Production by the Incumbent

The level of the public good in period $t \in \{1, 2\}$ is

$$g_t^j = e_t^j + \theta^j \quad \text{with } j \in \{I, C\}. \tag{1}$$

The variable $e_t^j \geq 0$ denotes the effort of the politician in power in period t and θ^j her competence. So the level of effort is a period-specific choice whereas competence remains constant over time.

A politician's competence is a realized value of the random variable Θ^j and we assume that politicians and voters share the common prior belief that $\Theta^j \sim N(0, 1/\tau_\theta)$. Thus, as usual in models of the career concern type, an incumbent does not know her own competence, so we do not need to consider signaling issues in the analysis.

Effort can be interpreted as the amount of time an incumbent devotes to activities like attracting grant monies, monitoring bureaucrats or negotiating contracts.[2] Ac-

[2]The variable e can also be interpreted as a measure of rent-seeking (see Alesina and Tabellini

cording to this interpretation, working hard reduces the time that is left for enjoying the amenities associated with political office. We introduce the cost function $c(e)$ that measures how much pleasure the incumbent forgoes by exerting effort. We assume that $c(e)$ is strictly convex with $c(0) = 0$, $c'(e) > 0$, $c(e)'' > 0$ and $\lim_{e \to 0} c'(e) = 0$.

When deciding on her effort level, the incumbent knows that the voters can use information about her performance in public good production in period 1 to help decide whether or not to re-elect her. By exerting more effort, the incumbent can increase public good provision and try to improve the voters' perception about her competence in order to raise the probability of her re-election $p(e_1)$. The incumbent's objective in period 1 is to maximize

$$p(e_1) \cdot [R - c(e_2)] - c(e_1), \tag{2}$$

where $R > 0$ denotes an exogenous rent from being in office. So the incumbent weighs the cost of effort in period 1 against the expected net rent in period 2.[3] The level of effort she chooses depends on the mapping of effort into the probability of re-election which depends on the electoral decision.

2.2 Voters

Each voter either votes for the incumbent or for the challenger and we label voter i's decision $v_i \in \{I, C\}$. There is no abstention. We assume that each voter votes sincerely given her information.

Each voter receives utility

$$u_t = g_t$$

from the incumbent's performance in in period t. Though each voter knows that the incumbent's performance influences her well-being, we assume that no voter can

(2007) or Gehlbach (2007), for example)

[3]We abstract from discounting throughout the analysis because including it would not generate any interesting insight.

directly observe performance. Voters do observe their overall well-being but they find it difficult to disentangle the specific contribution g_t to their overall well-being from other factors which are also relevant. Think of other politicians who are also involved in the provision of public goods or the state of the economy, for example. As no voter is pivotal in the election, there is no incentive to engage in private gathering of additional information but we assume that from living their everyday life voters can learn a little bit about the incumbent's performance.

Thus, before the election each voter i receives a private signal

$$s_i = g_1 + x_i \tag{3}$$

about the incumbent's performance and the voters can use this information when making their electoral decisions. We assume that the noise terms x_i are realized values of the random variable $X \sim N(0, 1/\tau_x)$ where τ_x measures the clarity of the signal. The noise terms x_i are independent, so the signals are independent conditional on a realized g_1. In principle, the precision of the noise terms (τ_x) can take on any positive value but we assume the precision to be very low in order to model ignorance of voters.

2.3 Timing of the Game

Period 1:

- Nature selects the competence of the incumbent θ^I which remains unknown to all players.
- The incumbent chooses the effort level e_1, and $g_1 = e_1 + \theta^I$ is realized but not observed by the voters.
- Each voter receives a private signal $s_i = g_1 + x_i$ and updates the belief about the incumbent's talent.
- The election takes place.

Period 2:

- The winner of the election chooses an effort level, and either $g_2^I = e_2^I + \theta^I$ or $g_2^C = e_2^C + \theta^C$ is realized.

3 Equilibrium

Voting. As the game ends after period 2, there will be no gain of exerting effort in period 2, and consequently, the winner of the election will not exert any effort. Thus, we have $e_2^I = e_2^C = 0$ and the competence of the elected politician is the only determinant of the level of the public good in period 2:

$$g_2 = \begin{cases} \theta^I & \text{for } v = I \\ \theta^C & \text{for } v = C, \end{cases}$$

where v denotes the result of the election. It follows that each voter votes for the candidate whom she expects to be more competent.

Voters update their beliefs in a Bayesian way. Thus, given a voter's belief $\tilde{e}$ about the incumbent's effort, the expected competence of the incumbent after having observed a signal s_i is

$$E(\Theta^I | s_i) = \frac{\tau_x}{\tau_x + \tau_\theta} \cdot (s_i - \tilde{e}),$$

which results from a standard signal extraction problem (see, for example, DeGroot (1970) or Pratt et al. (1995)).

As the challenger's expected competence is 0, voter i's decision is

$$v_i = \begin{cases} I & \text{for } E(\Theta^I | s_i) \geq 0 \\ C & \text{for } E(\Theta^I | s_i) < 0. \end{cases}$$

Incentives. To derive the incumbent's effort in period 1, we have to determine the

relation between p^I and effort. From now on, we drop the subscript and denote the first period's effort simply by e. Since the second period's effort is trivial, there is no risk of confusion.

From the incumbent's perspective, a voter i's posterior expectation of her talent is

$$E(\Theta^I|s_i) = \frac{\tau_x}{\tau_x + \tau_\theta} \cdot (e - \tilde{e} + \theta^I + x_i).$$

The incumbent considers how much effort to spend before the signals s_i are realized and thus a voter's opinion is a random variable for her. The incumbent needs at least half of the votes and she will achieve this number of votes if the voter who receives the median value of signal realizations votes for her. We call this voter the *(posterior) median voter*. It follows from the law of large numbers and the fact that the mean of a noise term x_i equals zero that the median voter's signal is $s_m = g + 0$ and that the median voter's opinion about the incumbent's competence equals

$$E(\Theta^I|s_m) = \frac{\tau_x}{\tau_x + \tau_\theta} \cdot (e - \tilde{e} + \theta^I).$$

Thus, although the incumbent's knowledge of some voter's opinion is very noisy, it follows from the law of large numbers that her knowledge of the decisive voter's opinion is relatively precise. From the incumbent's perspective, the only remaining source of uncertainty is the random variable Θ^I.

Given this knowledge about the median voter's opinion, the incumbent knows that she will be re-elected if

$$\frac{\tau_x}{\tau_x + \tau_\theta} \cdot (e - \tilde{e} + \theta^I) \geq 0. \tag{4}$$

The median voter's opinion (left-hand side of inequality (4)) is a normal random variable with mean $\mu = \frac{\tau_x}{\tau_x+\tau_\theta} \cdot (e - \tilde{e})$ and variance $\sigma^2 = \frac{\tau_x^2}{(\tau_x+\tau_\theta)^2 \cdot \tau_\theta}$.

It follows that the probability of re-election is

$$p^I = 1 - F(0; \mu, \sigma^2)$$

where F denotes the distribution function of the median voter's opinion.

This implies that the incumbent chooses effort in order to maximize

$$p^I(e) \cdot R - c(e) = (1 - F(0; \mu, \sigma^2)) \cdot R - c(e)$$

and thus optimal effort solves

$$-(\frac{\partial F}{\partial \mu}\frac{\partial \mu}{\partial e} + \frac{\partial F}{\partial \sigma^2}\underbrace{\frac{\partial \sigma^2}{\partial e}}_{=0})R = c'(e).$$

Two factors determine the effect of an additional unit of effort on the probability of re-election: (1) $\frac{\partial \mu}{\partial e}$ says by how much an additional unit of effort increases the mean and (2) $\frac{\partial F}{\partial \mu}$ says how increasing the mean changes the probability of re-election.

We obtain that optimal effort for given $\tilde{e}$ solves

$$f(0; \mu, \sigma^2) \cdot \frac{\tau_x}{\tau_x + \tau_\theta} \cdot R = c'(e),$$

where f denotes the density function of the median voter's opinion.

In equilibrium, we have $e = \tilde{e}$, and thus the incumbent's optimal effort in period 1 solves

$$\phi(0)\sqrt{\tau_\theta}R = c'(e^*), \tag{5}$$

where ϕ denotes the density function of the standard normal distribution. As c' is a strictly increasing function, effort is higher, the larger $\sqrt{\tau_\theta}R$.

Thus, we find that equilibrium effort is independent of the clarity of the signals (τ_x). This is because the respective effects of τ_x on $\frac{\partial \mu}{\partial e}$ and $\frac{\partial F}{\partial \mu}$ cancel out each other. On the one hand, a lower τ_x implies a lower impact of effort on μ, but, on the other hand, shifting μ pushes more probability mass over the threshold at zero. Put into more intuitive terms, a low clarity of the signal implies that effort is less effective in changing a voter's opinion, but a low clarity also implies that changing the opinion has a stronger impact on the probability of re-election. This is the case because with

low-clarity signals the median voter's opinion is more likely to be around the decisive threshold of zero.

The effort level described by equation (5) is identical to the effort level that the incumbent would choose were she confronted with a social planner who receives a perfect signal $s = g_1$ of her performance in period 1. The decision of the social planner is determined by her estimate of the incumbent's talent which is $s - \tilde{e} = e - \tilde{e} + \theta^I$ and thus she will re-elect the incumbent if $e - \tilde{e} + \theta^I \geq 0$. A comparison with inequality (4) shows that it is the term $e - \tilde{e} + \theta^I$ whose sign determines whether or not the incumbent is re-elected in case of both the collective decision and the social planner with perfect monitoring. Thus, the probability that the median voter estimates the incumbent's competence to be larger than 0 is the same as the probability that a social planner with a perfect signal estimates the incumbent's competence to be larger than 0:

$$Pr\left[\frac{\tau_x}{\tau_x + \tau_\theta} \cdot (e - \tilde{e} + \theta^I) \geq 0\right] = Pr\left[e - \tilde{e} + \theta^I \geq 0\right].$$

As a consequence, incentives are the same in both cases. Notice that the above equivalence holds irrespective of the value of τ_x. In other words, even if the precision of individual private signals is arbitrarily small, the incumbent behaves *as if* she is confronted with a social planner who receives a perfect signal $s = g_1$.

Hence, we establish an accountability counterpart of the jury theorem:

Proposition 1. *Even if each individual voter is poorly informed about the incumbent's performance, a large electorate is able to hold the politician accountable as much as a perfectly informed social planner would be.*

Proof. See above. □

The intuition behind proposition 1 is as follows: Individual opinions about the incumbent's talent can be highly error-laden but because of the law of large numbers the distribution of opinions in the electorate is such that the opinion based on a perfect observation of performance is decisive for the collective decision. A voter holding this median opinion is not aware of the fact that her observation of the incumbent's performance is perfect, but the incumbent correctly conjectures that the decisive vote is

based on such a perfect observation. Thus, although an increase of effort will only have a very small impact on the median voter's opinion (given some $\tilde{e}$) such a small effect can be enough to shift the median voter's opinion over the threshold for re-election. This is why it is lucrative for the incumbent to invest a high level of effort.

Selection. It is also instructive to study to which extent the collective decision can solve the problem of selecting competent politicians. From the prior perspective, the probability that the incumbent will be re-elected is $p^I = 1 - \Phi(0) = 1/2$. It is interesting, however, to analyze the probability that the collective decision will be correct for given realizations of the incumbent's talent. Assume again, that there is a social planner who receives a perfect signal $s = g_1$. The social planner's estimate of the incumbent's talent is $E(\theta^I|s) = e - \tilde{e} + \theta^I$ which reduces to θ^I in equilibrium. Thus, in equilibrium, the social planner knows the correct value of the incumbent's talent.

A social planner would retain an incumbent whose talent is equal to or larger than zero, the expected talent of a randomly drawn challenger and she would replace the incumbent by a challenger if the incumbent's talent is below zero.[4] Thus, her decision is described by:

$$v^{soc} = \begin{cases} I & \text{for } \theta^I \geq 0 \\ C & \text{for } \theta^I < 0. \end{cases}$$

We are interested in the probability that the collective decision v is correct in the sense that $v = v^{soc}$. Regarding the collective decision, we have $e = \tilde{e}$ in equilibrium and thus, for some given realized value of θ^I, it follows that

$$v = \begin{cases} I & \text{for } \frac{\tau_x}{\tau_x + \tau_\theta} \cdot \theta^I \geq 0 \\ C & \text{for } \frac{\tau_x}{\tau_x + \tau_\theta} \cdot \theta^I < 0 \end{cases}$$

[4]When the decision is made, the challenger's competence is not known. Hence, naturally, there still is the possibility that for $v = I$ the challenger will be more competent or that for $v = C$ the incumbent will be more competent. The correct decision to be made is to re-elect the incumbent with a higher competence than 0, the *expected* competence of the challenger.

and thus

$$v = \begin{cases} I & \text{for } \theta^I \geq 0 \\ C & \text{for } \theta^I < 0. \end{cases}$$

Thus, for every possible value of θ^I the collective decision is identical to the decision of the social planner.

Although the incumbent can manipulate the signals received by the voters, in equilibrium the voters correctly anticipate the incumbent's manipulation. In equilibrium, information aggregation is not adversely affected by the incumbent's manipulation and the jury theorem holds.

Proposition 2. *Even if each individual voter is very poorly informed about the incumbent's performance, a large electorate is able to elect the candidate that a perfectly informed social planner would elect.*

Proof. See above. □

Put together, the results described in Proposition 1 and Proposition 2 show that, in case of a large electorate of poorly informed voters, elections can achieve both: establishing high levels of accountability and selecting talented politicians.

4 Discussion

We have shown in the last section that a large electorate of ignorant voters is able to establish high levels of accountability. This result is based on the assumptions of homogenous preferences among voters and signals which are independent conditional on some realized performance of the incumbent. These assumptions correspond to 'classic' assumptions in models on the jury theorem.

However, it is well known that the optimistic result of the jury theorem in the traditional setting does not hold if we introduce correlated opinions (Ladha (1992)) or ideology (Krishna and Morgan (2011)). Thus, we shall briefly discuss how extending

our basic model in these directions would alter our results. As to that we focus on the novel aspect of our analysis, the incentive problem.[5]

4.1 Common Noise

Assume that all assumptions in the basic model continue to hold but now each voter receives a signal $s_i = g_1 + y + x_i$ where y and x_i are independent noise terms. For the collective noise term y we assume $Y \sim N(0, 1/\tau_y)$. In this case, the incumbent gets re-elected if the posterior median opinion is larger than zero:

$$\frac{\tau_x \tau_y}{\tau_\theta(\tau_x + \tau_y) + \tau_x \tau_y} \cdot (e - \tilde{e} + \theta^I + y) \geq 0.$$

Applying the same procedure as above then yields equilibrium effort which solves

$$\phi(0)\sqrt{\frac{\tau_\theta \tau_y}{\tau_\theta + \tau_y}}R = c'(e^*). \tag{6}$$

The level of effort with common noise is lower than in the basic model because from the incumbent's perspective the law of large numbers only eliminates the individual noise which blurs her knowledge about the median opinion. The uncertainty regarding the median opinion is now higher than in the basic model because of the collective noise element. Thus, it is now more likely that the median opinion is pushed away from the re-election threshold by y which makes it less lucrative to exert effort. The effort level defined in equation (6) is identical to the effort level that the incumbent would invest were she confronted with a social planner who receives a noisy signal $s = g_1 + y$.

[5]The potential harmful effects of ideology and correlated signals on the selection problem are well-established in the literature on the jury theorem. In our model, the voters correctly anticipate the incumbent's manipulation of the signals in equilibrium and thus the effects of ideology and correlated votes on the selection problem are as in the standard setup of models on the jury theorem.

4.2 Ideology

Let $u_{it} = g_t + \beta_i$ be voter i's utility in period t where β_i denotes ideological closeness of the incumbent to voter i relative to the challenger[6]. For instance, a positive value of β_i implies that voter i prefers the incumbent in the ideological dimension. We assume that for the incumbent $\beta_i \sim N(b, 1/\tau_\beta)$.

Then, voter i votes for the incumbent if

$$E(\Theta^I|s_i) + \beta_i \geq 0 \quad \Leftrightarrow \quad \frac{\tau_x}{\tau_x + \tau_\theta} \cdot (e - \tilde{e} + \theta^I) + \underbrace{\frac{\tau_x}{\tau_x + \tau_\theta} x_i + \beta_i}_{\text{individual component}} \geq 0$$

where for the individual component we have

$$\frac{\tau_x}{\tau_x + \tau_\theta} x_i + \beta_i \sim N(b, \frac{\tau_x}{(\tau_x + \tau_\theta)^2} + \frac{1}{\tau_\beta}).$$

It follows that the median voter casts her ballot for the incumbent if

$$\frac{\tau_x}{\tau_x + \tau_\theta} \cdot (e - \tilde{e} + \theta^I) + b \geq 0.$$

Applying the same procedure as above yields equilibrium effort

$$\phi \left[-b \cdot \frac{\tau_x + \tau_\theta}{\tau_x} \sqrt{\tau_\theta} \right] \sqrt{\tau_\theta} R = c'(e). \tag{7}$$

We can make the following observations: First, if the ideological leanings of voters are balanced in the sense that $b = 0$, then we obtain the same result as in the previous section so the electorate still can establish a high level of accountability despite the ideological preferences of voters. Second, if $b \neq 0$, effort will be lower than in the model without ideology. The effect of effort on a voter's belief about the incumbent's competence remains the same as before. Manipulating the median voter's belief, however, is not as valuable as before, because a small shift of her belief is not very likely to change the outcome of the election. This is because it is very likely that the median voter will

[6] We omit the subscript t for this parameter without any confusion, since it matters only for the voting decision at the end of the first period.

vote for or against the incumbent anyway.

4.3 Summary

To conclude, the level of accountability can be lower than in the basic model when we introduce ideological preferences of voters or correlated signals. Thus, policy outcomes can be adversely affected by ideology or correlated votes as is also the case with the standard model on the jury theorem. However, the literature on the jury theorem has shown that the classical approach can be modified such that the jury theorem holds under fairly general conditions. These modifications can include strategic voting behavior or the option to abstain in the election. For example, Krishna and Morgan (2011) show that the adverse influence of ideology on information aggregation need not appear if voting is not mandatory. It will be interesting to study whether modifications of our model along these lines will produce similar results regarding accountability considerations.

5 Conclusion

The celebrated jury theorem is reassuring since it tells us that we can trust the decision of a large electorate in choosing the right candidate even if every individual voter is very poorly informed. However, the jury theorem does not address another fundamental role of elections: holding politicians accountable. In this paper, we have shown that a large electorate which consists of poorly informed voters can also establish high levels of electoral accountability in addition to selecting talented politicians. Thus, a lack of information on the individual level need not be an obstacle to creating incentives for incumbent politicians to behave in the interest of the electorate. This result establishes an important counterpart to the jury theorem. Taken together, our model shows for the case of a large number of voters that elections can serve both of their main purposes well: selecting talented politicians and establishing accountability.

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