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When policy advisors cannot reach a consensus

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Abstract. In this paper advisors are selected by two ministers with conflicting interests in order to (1) acquire information, and (2) obtain political legitimacy concerning a project. In the end, parliament decides whether or not the project, of which the consequences are uncertain, is implemented. In principle a minister wants to appoint an advisor whose preferences are similar. However, since the advisor needs to convince the decisive player in the model, the minister may appoint an advisor whose preferences are closer to those of the agents to be persuaded. We also show when polarised advice occurs (the advisors have different preferences) and when consensual advice occurs (they have the same preferences).

1 Introduction

The positive analysis of government behaviour seeks to understand why policymakers implement particular policies. Since the nature of policy decisions is at least partly determined by information about policy effects, the analysis of political decision making requires a theory of the choice of view about the efficacy of policies.

Several studies have investigated the role of information about policy effects recently. In particular Roemer (1994), Swank (1994), Schultz (1997), Letterie and Swank (1997) and Cukierman and Tomassi (1998) analyse the interplay between politicians and voters in an environment where politicians

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are better informed about the consequences of policies than the electorate. In a democracy where the preferences of competing policymakers are polarised (cf. Alesina 1987) politicians will have incentive to exploit their informational advantage. Schultz (1996) argues that for a stylized two-party system inefficiencies arise, because the incumbent political party has an incentive to highlight the merits and to disguise the drawbacks of a policy in order to convince voters of the desirability of her decision. The bottomline is that polarisation is harmful because the struggle for political influence precludes policies adjusting to the true costs.

An important aspect of the studies cited above is that these only focus on the relationship between political parties and voters. However, because policymakers lack information about the consequences of policy themselves as well, a leading role is played by advisors. Cukierman and Tomassi (1998, p. 181) note that "Incumbent politicians normally have better information than the general public about the likely outcomes of alternative policies. Governments deal with public policy issues on a daily basis, *they have access to the advice of specialists*, and in some cases they possess classified information." In this paper we argue that information asymmetries regarding the mapping of policy instruments into outcomes provides certain political actors a means to affect the equilibrium outcomes of a political process. In particular, those actors will employ their discretion to send messages or to appoint advisors as a means to influence the policy outcome in a favourable way.

Of course, there are other possibilities to influence policy outcomes. For instance, Grossman and Helpman (1994) argue that government policy may depend on the pressure exerted by lobby groups rewarding particular decisions taken by an incumbent policymaker. These groups may induce the policymaker to behave in the interest of the lobby by offering contributions to the officeholder. In this environment it is obvious that outcomes reflect the preferences of the lobby, although the initial preferences of the lobby group and the officeholder may differ substantially.

Often politicians have the ability to appoint advisors, who may serve two roles. First, policymakers may consult advisors to acquire information about the consequences of an innovation. This is what we would like to refer to as the information motive of advice. Secondly, advisors may be consulted to enhance political support for a decision. This is called the persuasion motive of advice.

If a policymaker is risk averse he can reduce his uncertainty by acquiring information. Hence, consulting an advisor may reduce the probability of making a "wrong" decision. Crawford and Sobel (1982), Calvert (1985) and Lupia and McCubbins (1994b) have shown that predispositional similarity plays an important role when acquiring advice. If the preferences of a sender and a receiver of a message are aligned a sender has little incentive to use information strategically, and the likelihood that the information provider truthfully reveals his knowledge is large. Nevertheless, a receiver's ability to learn from an expert may improve for the following four reasons. First, learning improves as penalties for lying increase (Lupia and McCubbins 1994a,b). Secondly, learning is enhanced if higher costs are associated with actions undertaken by the sender (Lupia and McCubbins 1994a,b). Thirdly, the possibility to verify information by the receiver of a message or by consulting a third party improves learning (Lupia and McCubbins 1994b). Fourthly, if the sender may prove he is knowledgable (Austen-Smith 1994) possibilities to learn increase. These features may be used to design institutions that substitute for shared predispositions to enhance learning.

Hence, various arguments exist why policymakers may attend to sources that have a different predisposition. In this paper we offer an additional explanation why predispositional similarity may be abandoned as a selection criterion for choosing advisors. In particular we show under what conditions political actors choose advisors whose preferences are at odds with their own and we show why this is so. We use the fact that a policymaker may use advice to support political legitimacy of her decision, which is the second role an advisor may serve. Letterie and Swank (1997) consider a model in which advice may be used to acquire information to avoid "wrong" decisions and to convince voters of the desirability of her policy decision. Their analysis presumes that the advisor has private information about the effects of a policy proposal which are uncertain to the other players of the game, because the mapping of policy instruments to outcomes is affected by one stochastic variable. The advisor is appointed by the policymaker. Upon observing the message of the advisor concerning the desirability of the public policy the median voter in parliament decides whether or not the policy decision is approved. Letterie and Swank (1997) show that in principle the policymaker has an incentive to appoint an advisor whose preferences are closely aligned to his own preferences. However, under certain conditions the policymaker will abandon predispositional similarity in order to be able to convince the median voter in parliament about the merits of a policy decision.

The present paper extends the model of Letterie and Swank (1997) in the following directions. First, in the model the outcome of a policy is uncertain due to the presence of two stochastic variables. This reflects the notion that the consequences of many policy decisions are uncertain in several respects. For instance, there is often a considerable amount of uncertainty about how large public construction projects like dikes or harbours will affect surrounding ecological systems. Furthermore, due to engineering uncertainties it is often hard to predict the cost of the construction bearing on the government budget. Secondly, we will set-up an economic model of policy advice in which *five* players determine the outcome of a policy debate: a spending minister who initiates a project; a finance minister whose approval is sought if the spending minister gets the go-sign from his advisor, and once the project has passed the finance minister the project still has to be approved by parliament. Both the ministers are assisted by appointed policy advisors who are experts on a particular aspect of the project. Parliament has no policy advisor. It has to make a decision based on the information provided by the specialised advisors of the spending and finance minister.

The model is analysed using game theoretical insights. Our results are related to those obtained in cheap talk games as developed by Crawford and

Sobel (1982) and Letterie and Swank (1997). Using this model we are able to shed some light on the role of advisors. In particular, the fact that our model revolves around the selection of two advisors allows us to analyse when the preferences of these advisors are the same or when they are different. Often, if policy advisors produce contradictory research reports they are dismissed as a quarrelsome lot (see van Dalen et al. 1998). However, the characterisation of advisors as the instigators of a polarised policy debate is not entirely correct, as we will show. The appearance of states of dissension and consensus in political debates are common phenomena and it is our aim to discover when policy advisors tend to agree or disagree with each other. We show that polarisation of advice is not necessarily the rule, even though the policy-makers in charge may have divergent biases. There are, however, forces at work which make dissension among avisors a likely outcome; forces such as the circumstance that the spending minister is highly in favour of spending while at the same time the median voter in parliament is not in favour of spending. This implies that the preferences of the ministers are crucial to understand whether a state of dissension or consensus in policy debates appears. Finally, we show that once a democracy is trapped in an equilibrium of polarisation, the degree of polarisation increases if the preferences of the spending and finance department become more polarized and if the uncertainty surrounding the project or proposal increases.

The contents of this paper are the following. First, we will set up an economic model of policy advice (Sect. 2). The model is analysed in Sect. 3 and subsequently discussed in some detail in Sects. 4 and 5. Section 6 winds up with a discussion of our model of policy advice.

2 A model of policy advice

The model revolves around a certain project, X. As to this project there are two alternatives: the project is undertaken ($X = 1$) or the status quo is maintained ($X = 0$). If the project is undertaken an arbitrary individual, denoted I, receives a pay-off equal to:

$$\Pi_I(X = 1|\varepsilon, \mu) = i + \varepsilon + \mu \tag{1}$$

where i measures the extent to which player I is biased towards undertaking the project. The consequences of the project are surrounded with uncertainty. This is formalised by introducing the stochastic terms ε and μ which are uniformly and independently distributed over the interval $[-\mathrm{t}, \mathrm{t}]$. Considering prevailing information on ε and μ some players in our model may prefer the status quo to the implementation of the project. If the project is not undertaken, the status quo prevails in which case for any player I the pay-off equals zero ($\Pi_\mathrm{I}(X = 0) = 0$). Hence, an individual I attributes highest utility to the status quo if $E(\Pi_\mathrm{I}(X = 1|\varepsilon, \mu)) < 0$.

The presence of these two stochastic variables reflects the notion that the consequences of many policy decisions are uncertain in several respects. The assumptions of independent and of identical distributions are made to facilitate our analysis. Of course, this is an approximation of reality. However, there are many examples in which the independence assumption is likely to hold. Consider for instance the construction of large public projects like dikes or harbours. Often there is a considerable amount of uncertainty about how such projects will affect surrounding ecological systems. Furthermore, due to engineering uncertainties it is often hard to predict the cost of the construction.

Due to various sources of uncertainty, advice concerning these matters does not come available at one point in time, but arrives sequentially as the agenda setter – in most cases a spending minister supported by his research staff – proposes a national project which has to compete with other interests inside government. In most cases the minister of finance performs the role of the nation's financial watchdog, and he also consults his advisors. Finally, congress or parliament has to approve of the project, if it ever reaches that destination. In the evaluation of the project members of parliament have to rely on the information provided by the two advisors of the ministers in the preparatory stage.

To analyse advisor selection in this political setting we consider a model in which five players are involved in making a decision about the project. There are two ministers, the median voter in parliament and two advisors. The first player, labelled S, is the minister of a spending department. The clientele of player S receives relatively high benefits from the project. If the project is undertaken, the pay-off of player S is given by $\Pi_S(X = 1|\varepsilon, \mu) = s + \varepsilon + \mu$, where s measures the department's bias towards the project. Without further information about ε and μ the spending minister expects to benefit from undertaking the project: $E(\Pi_S(X = 1|\varepsilon, \mu)) > 0$. This implies $s > 0$.

The second player, F, is the finance minister. The finance minister is assumed to be primarily interested in fiscal discipline, and is therefore less biased towards undertaking the project than the spending minister. Hence, if the project is undertaken, player F's pay-off is given by $\Pi_F(X = 1|\varepsilon, \mu) = f + \varepsilon + \mu$, where $f < s$.

Undertaking the project requires approval by parliament. The third player in the game is the median voter in parliament, and, for brevity, is called the median voter, V. The median voter is bound neither by the particular interests of the spending department nor by the particular interests of the finance department. For this reason, V's predisposition towards the project, v, is assumed to lie between f and s. Hence, $\Pi_V(X = 1|\varepsilon, \mu) = v + \varepsilon + \mu$, where $f < v < s$.

Both the spending minister and the finance minister have the authority over a research staff. The research staff of the finance minister, player B_F, is specialised in assessing the costs of projects. Player B_F has private information about the realisation of μ. The last player in the model, B_S, is the research staff of the spending minister, which has private information about the realisation of ε. Like the other players in the model, members of the research staffs are characterised by their predispositions towards the project. The pay-off of a bureaucrat B, where $B \in \{B_S, B_F\}$ is given by: $\Pi_B(X = 1|\varepsilon, \mu) = b + \varepsilon + \mu$, where $b \in \{b_S, b_F\}$. Each minister appoints the researchers working for him. It is assumed that there exists a continuum of applicants for the research jobs in terms of their predispositions towards the project. Hence, the parameters b_S and b_F are choice variables for players S and F, respectively.

An individual I in our model receives a pay-off equal to $i + \varepsilon + \mu$ if the project is undertaken. In principle there is no a priori reason why the different players would weight the random shocks ε and μ equally. For instance, it is likely that the spending minister is not as interested in the consequences of the project for the government budget as the finance minister. Hence, S may weight μ by $\vartheta \in (0, 1)$. Similarly, F may weight ε. We conjecture that our results remain by considering this extension. We abstract from weighting shocks for tractability reasons. The same argument applies for considering risk aversion. We assume that all individuals are risk neutral. A drawback of this assumption is that risk neutrality for all agents removes some of the economic rationale for getting advice. However, in this paper we primarily study how advice may be used to persuade other players in the policy process. Therefore, we abstract from risk aversion, because it would complicate the analysis tremendously. The case of acquiring advice to reduce uncertainty has been studied by Calvert (1985) for instance. He argues that reducing uncertainty requires attending to sources that share the decision maker's own predispositions (see also Crawford and Sobel 1982). This argument applies in particular if political institutions are lacking that may serve as a substitute for shared predispositions to enhance a sender's credibility (cf. Lupia and McCubbins 1994a,b). In this paper we assume that such institutions are absent. For instance, in our model an advisor does not face a penalty for lying and the probability of detection is zero. Furthermore, the advisor does not incur any cost associated with taking action.

Now that we have described the players in the game and their pay-offs, let us discuss the order of actions in the game. In the first stage of the game, nature chooses ε and μ. In stage two, the spending minister, labelled S, appoints the members of his research staff: $b_S \in (-\infty, \infty)$. In the third stage, the realisation of ε is revealed to the research staff of the spending department. Next, the research staff sends a message, m_S, about the desirability of the project. Two messages can be sent: the project should be undertaken, Y_S, or the project should not be undertaken, N_S. More formally, $m_S \in \{Y_S, N_S\}$. This assumption implies that we consider the bureaucrats' message to be non-verifiable.[1] Since the choice of whether or not to implement the project is

[1] In our model the advisor is assumed to be informed about a stochastic variable. We do not focus on the credibility of the advisor. Such an extension can however be found in Austen-Smith (1994) who develops a model in which the advisor (sender) decides whether or not to acquire information. Without any further information this decision is unobserved by the receiver of the message, hence a verfiability problem exists. Austen-Smith allows for a more complicated message space. An informed sender may provide both information about the realisation of a stochastic variable (like in our model), and the sender may credibly provide some information that he or she is informed. We disregard this extension of the model for tractability reasons. Furthermore, we disregard

a binary decision problem, 'yes' and 'no' messages are suitable in our framework.

If $m_S = Y_S$, the spending minister puts forward a proposal to undertake the project. In contrast, if $m_S = N_S$, the game ends. In the fourth stage of the game, the minister of finance appoints the members of his research staff: $b_F \in (-\infty, \infty)$. Next, in stage five the realisation of μ is revealed to the research staff of the finance minister. Player B_F sends a message about the desirability of the project, taking into account the information revealed about ε by B_S. Analogous to B_S, B_F can send two messages: $m_F \in \{Y_F, N_F\}$. Finally, in the last stage of the game the median voter accepts or rejects the proposal put forward by the spending minister.

In the game described above we have made a number of additional restrictive assumptions. First of all, we have assumed that if the research staff of the spending department sends a message not to undertake the project, the spending minister decides not to undertake the project and hence the game ends. This assumption reduces the number of cases to be examined considerably. A drawback of this assumption is that communication between the research staff of the spending department and the other players in the model is not a result, but more or less imposed. However, as we will see in Sect. 3 for all interesting cases communication between the research staff of the finance minister and the median voter, where nothing is imposed, is the most likely case.

One way of looking at the assumption is that a minister, who puts forward a proposal to undertake the project against the recommendation of his research staff, runs the risk of political isolation if the project is rejected. Such a minister will be characterised as a Don Quixote-type, rather than as somebody who takes the interests of his clientele serious.[2] Alternatively, one may imagine that research staffs of various spending departments compete for setting projects on the political agenda. All projects which are not supported by their research staffs loose to projects which are supported.[3]

A second assumption is that the spending minister does not appoint individuals to do research on μ. Likewise the research staff of the finance minister does not do research on ε. This assumption has some appeal in that research

the possibility that the median voter in parliament and the ministers are able to acquire a direct observation of the stochastic variable themselves or by consulting an exogenous third party who can disclose information regarding the random shocks. To put it differently, they are not able to verify the realisation of these variables (see also Lupia and McCubbins 1994b).

[2] We can incorporate this into our game formally by assuming that the pay-off of player S is far below zero if $m_S = N_S$ and his proposal to undertake the project is rejected by parliament. Then player S will never put forward a proposal against the recommendation of his research staff.

[3] If the research staff of the spending minister serves as the agenda setter, a more plausible order of action is that first player S determines b_S, next nature reveals ε to player b_S, and then player b_S sends a message. The resulting model yields the same results as the game discussed in the main text.

staffs of departments seem to be specialised. One argument for specialisation is that it avoids duplication of research. This argument is especially strong if the costs of research on a specific field decline with the scale of research, but the costs of research increase when the field of research becomes broader. In this paper, we do not explain why research staffs are specialised. Nevertheless, it is likely that this assumption does affect our results. In line with this, for instance, Lupia and McCubbins (1994b) find that if there is a possibility to verify information by consulting another expert and if there are substantial (reputational) penalties for lying, incentives to mislead reduce and learning may improve.

Thirdly, we assume that only the spending and finance minister can appoint advisors. In our model parliament does not have the opportunity to employ an external advisor to check the validity of advise provided by the bureaucrats. The results of our analysis are likely to depend on this assumption, even if such appointments are made only occasionally.[4]

Fourthly, the assumed order of play is somewhat arbitrary and perhaps even implausible. However, without changing the outcome of the game, various stages can be alternated. The only thing that matters is that the median voter acts in the last stage of the game, and that player B_S acts before player B_F. We have chosen the order of actions described above mainly to facilitate the discussion about the equilibria of the game. However, the order of play does introduce an asymmetry which can be crucial for the resulting equilibrium. In particular, player B_F can take account of information on ε as revealed by B_S, whereas B_S is not able by definition to incorporate information on μ. B_S does, however, know that the finance minister uses advisors strategically.

To make the game interesting we have to make some additional assumptions about the players' predispositions and the intervals ε and μ must lie within. Evidently, if t is very small relative to the differences between the predisposition of the spending ministers and the median voter, the messages of the research staffs cannot affect the decision about the project. Throughout this paper we assume that $s > 0$, $f < v < s < \mathrm{t}$, and that $f + \mathrm{t} > 0$. These restrictions assure that communication between the median voter and one of the research staffs may affect the median voter's decision about the project. Table 1 summarises the game:

Table 1. Summary of the game

Players
$\mathrm{S}, \mathrm{F}, \mathrm{B_S}, \mathrm{B_F}$ and V

Order of Events

(1) Nature chooses ε and μ; both ε and μ are uniformly distributed on $[-\mathrm{t}, \mathrm{t}]$

[4] See also footnote 1.

(2) S chooses $b_S \in (-\infty, \infty)$ by appointing B_S
(3) B_S observes ε and sends message $m_S \in \{Y_S, N_S\}$; if $m_S = N_S$ the game ends and $X = 0$; if $m_S = Y_S$, then S puts forward a proposal to undertake the project
(4) F chooses $b_F \in (-\infty, \infty)$ by appointing B_F
(5) B_F observes μ and sends message $m_F \in \{Y_F, N_F\}$
(6) V chooses $X \in \{1, 0\}$

Pay-offs

- $\Pi_I(X = 1|\varepsilon, \mu) = i + \varepsilon + \mu$ where $I = \{S, F, B_S, B_F, V\}$ and $i = \{s, f, b_S, b_F, v\}$ with $s > 0$, $f < v < s < t$ and $f + t > 0$
- $\Pi_I(X = 0) = 0$

3 Equilibria

Necessary conditions for a perfect Bayesian equilibrium of the game are (1) the players' actions must be optimal responses to each other, and (2) the players' beliefs about ε and μ must follow Bayes' rule. In order to facilitate the discussion of the formal analysis we split the game into two parts. The first part consists of the actions of the spending minister and his research staff in stages 2–3. The second part comprises the players' actions in stages 4–6. Because we should solve the game by backward induction to ensure time consistency, we start the analysis with a discussion about the second part.

3.1 The median voter, the finance minister, and his research staff

In stages 4–6 the following events can develop: the median voter accepts or rejects the proposal, the research staff of the finance department sends a message about the desirability of the project, and the finance minister selects his researchers. Because the game ends in stage 3 if in stage 2 the research staff of S has sent $m_S = N_S$, we suppose that $m_S = Y_S$. Players' beliefs about ε, given $m_S = Y_S$, are denoted by $E(\varepsilon|m_S = Y_S)$, where $E(.)$ denotes the expectations operator.

First, consider the action of the research staff of the finance department. Player B_F wants the median voter to accept the proposal if and only if he expects the project to yield higher expected utility than the status quo:[5]

$$b_F + E(\varepsilon|m_S = Y_S) + \mu > 0 \tag{2}$$

In this case the advisor should recommend the project by sending Y_F in order to persuade the median voter to vote in favour of the project. Otherwise, B_F should send N_F.

Next, consider the median voter's optimal response to player B_F's strategy. Player B_F's action affects the beliefs about μ. Using (2) and the stochastic properties of μ, Bayes' rule implies that the beliefs concerning μ are updated as

[5] Without loss of generality it is assumed that if the median voter is indifferent between accepting the proposal and rejecting the proposal, he will not approve the proposal.

follows:

$$
\begin{aligned}
E(\mu|m_F = Y_F) &= \frac{1}{2}[\mathrm{t} - b_F - E(\varepsilon|m_S = Y_S)] \\
E(\mu|m_F = N_F) &= -\frac{1}{2}[\mathrm{t} + b_F + E(\varepsilon|m_S = Y_S)]
\end{aligned} \tag{3}
$$

Using (3) we obtain the median voter's expected pay-off, conditional on the messages of the research staffs:

$$
\begin{aligned}
E(\pi_V|m_F = Y_F) &= v + \frac{1}{2}E(\varepsilon|m_S = Y_S) + \frac{1}{2}[\mathrm{t} - b_F] \\
E(\pi_V|m_F = N_F) &= v + \frac{1}{2}E(\varepsilon|m_S = Y_S) - \frac{1}{2}[\mathrm{t} + b_F]
\end{aligned} \tag{4}
$$

Now consider the selection of b_{F} by the finance minister. The finance minister wants the project to be undertaken if and only if the expected pay-off of undertaking the project exceeds that of the status quo:

$$f + E(\varepsilon|m_S = Y_S) + E(\mu|m_F) > 0 \tag{5}$$

The finance minister cannot directly affect the median voter's decision about the project. However, because the message of his research staff may induce the final decision about the project, the finance minister may indirectly influence the final decision through its choice of b_{F}. Of course, this requires that communication occurs between the median voter and the research staff. It is evident that the median voter always rejects the proposal if a recommendation of the project by the advisor of the finance minister yields a negative expected utility: $E(\Pi_V|m_{\mathrm{F}} = Y_{\mathrm{F}}) < 0$. Similarly, the median voter always accepts the proposal, regardless the message sent by $\mathrm{B_F}$, if $E(\Pi_V|m_{\mathrm{F}} = N_{\mathrm{F}}) > 0$. Obviously, the finance minister is only interested in appointing a research staff which can communicate with the median voter. Hence, the interesting case occurs if $E(\pi_V|m_{\mathrm{F}} = Y_{\mathrm{F}}) > 0$ and $E(\pi_V|m_{\mathrm{F}} = N_{\mathrm{F}}) \leq 0$. In this case, the median voter accepts the proposal if $m_{\mathrm{F}} = Y_{\mathrm{F}}$ and rejects the proposal if $m_{\mathrm{F}} = N_{\mathrm{F}}$. This imposes the following restrictions on the choice of b_{F} (see (4)):

$$2v + E(\varepsilon|m_S = Y_S) - \mathrm{t} \leq b_F < 2v + E(\varepsilon|m_S = Y_S) + \mathrm{t} \tag{6}$$

If (6) is violated, the median voter ignores the message sent by $\mathrm{B_F}$, so that $\mathrm{B_F}$ does not affect the finance minister's expected pay-off.[6] However, if (6) holds, the median voter favours the status quo if the research staff advises not to undertake the project. Then the median voter votes against the project if he observes message N_{F}, in which case utility is equal to zero. Hence, $\mathrm{Prob}(m_{\mathrm{F}} = N_{\mathrm{F}})E(\Pi_F|m_{\mathrm{F}} = N_{\mathrm{F}}) = 0$. Using this we obtain the finance minis-

[6] The upperbound of (6) is never violated in equilibrium. In particular in Appendix E we argue that player F always chooses b_{F} such that $E(\pi_{\mathrm{V}}|m_{\mathrm{F}} = Y_{\mathrm{F}}) \geq 0$. Furthermore, the lowerbound is also satisfied due to equation (8). Hence, communication is always possible between $\mathrm{B_F}$ and V.

ter's expected pay-off:

$$E(\Pi_F) = \mathrm{Prob}(m_F = Y_F)E(\pi_F|m_F = Y_F) = \frac{1}{2\mathrm{t}}[\mathrm{t} + b_F + E(\varepsilon|m_S = Y_S)] \times \left[f + \frac{1}{2}E(\varepsilon|m_S = Y_S) + \frac{1}{2}(\mathrm{t} - b_F)\right] \tag{7}$$

Maximising (7) with respect to b_F, subject to (6) yields

$$\begin{aligned}&(1)\ b_F = f \quad \text{if } 2v + E(\varepsilon|m_S = Y_S) - \mathrm{t} \leq f;\\ &(2)\ b_F = 2v + E(\varepsilon|m_S = Y_S) - \mathrm{t} \text{ otherwise}\end{aligned} \tag{8}$$

The first part of Eq. (8) shows that in principle, the finance minister wants to appoint researchers whose predispositions coincide with that of himself. This happens if B_F's information convinces the median voter that the finance minister's wishes regarding the project are in line with the voter's. Since parliament decides about the implementation of the project, the finance minister must assure that communication takes place between B_F and V. This requires that b_F is close to v (the restriction in 6). If the restriction is violated, the finance minister is forced to appoint a staff of researchers whose predisposition toward the project is closer to that of the median voter. Since by assumption $f < v < s$, this implies that the finance minister must select $b_F > f$. The second part of Eq. (8) gives the lowest value of b_F for which communication between the median voter and the research staff occurs.

It follows from the above discussion that if the messages of both advisors are favourable (i.e. $m_S = Y_S$ and $m_F = Y_F$) then the median voter chooses to support the project ($X = 1$). In contrast, if B_S sends $m_S = Y_S$ and B_F sends $m_F = N_F$ then the median voter will not support the project ($X = 0$).

So far we have only considered a partially pooling equilibrium for this part of the game. However, the message sent by B_F does not directly affect the other players' pay-off. Therefore, this part of the model belongs to the class of "cheap-talk" games (Crawford and Sobel 1982). In this type of games also a pooling equilibrium exists, in which the receivers of a message ignore it and where the message $m_F \in [Y_F, N_F]$ is independent of the actual value of μ. For instance, B_F always sends the message $m_F = Y_F$. Then the posterior beliefs are equal to the prior beliefs and if prior beliefs are not updated in response to messages then $E(\mu) = E(\mu|m_F)$ remains equal to zero. Obviously the posited strategies are optimal responses to each other, raising the question whether a pooling equilibrium or partially pooling equilibrium as discussed before is most likely to occur. However, the pooling equilibrium is unstable, whereas the partially pooling equilibrium is not. If there is a small probability that V does not ignore the message sent by B_F, player B_F has an incentive to send messages that communicate information to V. In particular, if (2) holds, B_F has an incentive to send $m_F = Y_F$; otherwise B_F will send $m_F = N_F$.[7] How-

[7] Note that B_F will also adhere to this strategy if there is a small probability that V does not listen to B_F.

ever, then V will follow the advice sent by B_F. In short, since a partially pooling equilibrium exists, a pooling equilibrium is unlikely to occur.

3.2 The spending minister and his research staff

In stages 2–3 of the game, the spending minister chooses b_S, and the research staff of the spending minister sends a message about the desirability of the project. Both players anticipate upon the strategies of the players acting in stages 4–6.

First consider the action of the research staff of the spending minister. By assumption, the game ends if $m_S = N_S$, implying that if player B_S expects to benefit from the project, he should send $m_S = Y_S$. In order to calculate player B_S' expected utility it is convenient to condition on the message sent by B_F. B_S anticipates that for unfavourable values of μ, player B_F sends N_F. This induces parliament to reject the proposal to undertake the project, implying that the status quo remains. Therefore, $\text{Prob}(m_F = N_F)E(\Pi_S|m_F = N_F) = 0$. We obtain:

$$E(\Pi_{B_S}) = \text{Prob}(m_F = Y_F)[b_S + \varepsilon + E(\mu|m_F = Y_F)] \tag{9}$$

where $E(\mu|m_F = Y_F)$ is given by (3). Eq. (9) shows that even though the research staff of the spending minister has no information about μ, its action is based on the conditional expected value of μ.

According to Eq. (9) B_S should send message Y_S if and only if:

$$\varepsilon > -b_S - E(\mu|m_F = Y_F) \tag{10}$$

After substitution of (3) into (10) the stochastic properties of ε and Bayes' rule imply that the beliefs about ε respond to the message sent by B_S as follows:

$$\begin{aligned} E(\varepsilon|m_S = Y_S) &= \frac{1}{3}(\mathrm{t} - 2b_S + b_F) \\ E(\varepsilon|m_S = N_S) &= -\frac{1}{3}(2\mathrm{t} + 2b_S - b_F) \end{aligned} \tag{11}$$

Let us now consider the response of player S to the other players' strategies. We have to consider two cases: (1) the case where $b_F = f$, and (2) the case where $b_F = 2v + E(\varepsilon|m_S = Y_S) - \mathrm{t}$ (see also Eq. (8)).[8]

3.2.1 Case 1: The finance minister chooses $b_F = f$

The strategies of the players acting after player S imply that the project is only undertaken if both research staffs advise that the project should be undertaken. Hence, when choosing b_S, the expected pay-off of player S is given by:

$$\begin{aligned} E(\Pi_S) = {} & \text{Prob}(m_S = Y_S)\,\text{Prob}(m_F = Y_F) \\ & \times [s + E(\varepsilon|m_S = Y_S) + E(\mu|m_F = Y_F)] \end{aligned} \tag{12}$$

[8] The expressions for $E(\mu|m_F = Y_F)$ and $E(\mu|m_F = N_F)$ in Table 2 can be found by substituting (11) into (3).

where

$$\begin{aligned}\text{Prob}(m_S = Y_S) &= \frac{1}{3\text{t}}(2\text{t} + 2b_S - f)\\ \text{Prob}(m_F = Y_F) &= \frac{1}{3\text{t}}(2\text{t} + 2f - b_S)\end{aligned} \tag{13}$$

$E(\mu|m_{\text{F}} = Y_{\text{F}})$ and $E(\varepsilon|m_{\text{S}} = Y_{\text{S}})$ are given by Eqs. (3) and (10) respectively.

It follows from (13) that higher values of b_{S} increase the probability that $m_{\text{S}} = Y_{\text{S}}$, but decrease the probability that $m_{\text{F}} = Y_{\text{F}}$. The intuition behind this is straightfoward. It is unlikely that a research staff, which is strongly biased towards undertaking the project, advises not to undertake the project. As a consequence, if such a research staff recommends the project, little information is revealed about ε, so that $m_{\text{S}} = Y_{\text{S}}$ tends to have smaller effects on the attitude of the research staff of the finance minister towards the project as b_{S} increases. Then, in the eyes of B_{F}, advisor B_{S} becomes less credible. Differentiating (12) with respect to b_{s} yields the following first order condition:[9]

$$\begin{aligned}&2b_S^2 - 2(2\text{t} + 2s + f)b_S + 2s\text{t} - f^2 + 2\text{t}f + 5sf = 0\\ &\text{with } b_S \in \left(\max\left(\frac{1}{2}f - \text{t}, 2f - \text{t}\right),\ \min\left(\frac{1}{2}(f + \text{t}), 2(f + \text{t})\right)\right)\end{aligned} \tag{14}$$

Solving for b_{S} gives after some tedious but straightforward algebra the following expression:

$$b_S^* = \text{t} + s + \frac{1}{2}f - \sqrt{\left(t + \frac{1}{2}s\right)^2 + \frac{3}{4}(f - s)^2} \tag{15}$$

In Sect. 4 of this paper we discuss the properties of b_{S}^*. However, it is worthwhile to note here that b_{S}^* depends not only on the bias of its own minister, s, but also on that of the finance minister, f, while b_{S}^* is not related to the preference parameter of the median voter, v. This may seem surprising, since the median voter in parliament ultimately decides whether the project is undertaken or not, and accordingly has to be convinced about the merits of the project. However, we know that if case 1 applies where $b_{\text{F}} = f$, the message of the finance minister's research staff convinces the median voter. Hence, the advisor of the finance minister needs to be persuaded about the desirability of the project. Therefore, the spending minister primarily considers the consequences of selecting b_{S} on B_{F}'s perception regarding the desirability of the

[9] Eq. (12) is a third degree polynomial function of b_{s}, having a local maximum and a local minimum. Clearly, the probabilities of the advice of the two research staffs to undertake the project should be non-negative and smaller than one. In Appendix A we show this is the case because b_{s} satisfies $b_{\text{s}} \in (\max(\frac{1}{2}f - \text{t}, 2f - \text{t}), \min(\frac{1}{2}(\text{t} + \text{f}), 2(\text{t} + \text{f})))$. It is straightforward to show that the maximum in this interval is the optimal value of $b_{\text{s}} : b_{\text{s}}^*$.

project, which explains why the parameter f appears in (15) and the parameter v does not.

3.2.2 Case 2: The finance minister chooses $b_{\mathrm{F}} = 2v + E(\varepsilon|m_{\mathrm{S}} = Y_{\mathrm{S}}) - \mathrm{t}$
Now player S′ expected utility is given by

$$E(\Pi_S) = \mathrm{Prob}(m_S = Y_S)\,\mathrm{Prob}(m_F = Y_F) \times [s + E(\varepsilon|m_S = Y_S) + E(\mu|m_F = Y_F)] \tag{16}$$

where

$$\begin{aligned} \mathrm{Prob}(m_S = Y_S) &= \frac{1}{\mathrm{t}}(t - v + b_S) \\ \mathrm{Prob}(m_F = Y_F) &= \frac{1}{\mathrm{t}}(2v - b_S) \end{aligned} \tag{17}$$

Differentiating (16) with respect to b_{S}, after substitution of $b_{\mathrm{F}} = 2v + E(\varepsilon|m_{\mathrm{S}} = Y_{\mathrm{S}}) - \mathrm{t}$ yields that the first order condition holds if:

$$b_S = b_c^* = \frac{3}{2}v - \frac{1}{2}\mathrm{t} \tag{18}$$

It follows straightforwardly that then $b_{\mathrm{F}} = b_{\mathrm{S}} = b_{\mathrm{c}}^*$. Hence, F and S choose advisors that have the same predisposition towards the project.[10] Note that now, in contrast to case 1, the preference parameter of the median voter, v, plays an important role in designing optimal research staffs. This is due to the fact that the finance minister has to appoint a research staff that can convince the median voter by choosing $b_{\mathrm{F}} = 2v + E(\varepsilon|m_{\mathrm{S}} = Y_{\mathrm{S}}) - \mathrm{t}$, which introduces the parameter v into the optimisation problem of the spending minister. In turn, v appears in the optimal value of b_{S}.[11]

4 Polarisation or consensus?

In the previous section we have shown that the spending minister either chooses $b_{\mathrm{S}} = b_{\mathrm{S}}^*$ or $b_{\mathrm{S}} = b_{\mathrm{c}}^*$. In appendix B we derive Proposition 1, which provides insight into the question which of these two possibilities is selected by S.

Proposition 1. *There exists a threshold $C \in (f, \frac{1}{2}(f + b_S^*))$ such that if $b_c^* < C$ then polarisation occurs where the ministers choose a different type of advisors ($b_S = b_S^*$ and $b_F = f$), otherwise, consensus holds where they choose the same type of advisor ($b_S = b_F = b_c^*$).*

[10] Note that if $b_{\mathrm{S}} = b_{\mathrm{F}} = b_{\mathrm{c}}^*$ then $\mathrm{Prob}(m_{\mathrm{S}} = Y_{\mathrm{S}}) = \mathrm{Prob}(m_{\mathrm{F}} = Y_{\mathrm{F}}) = (t + v)/2\mathrm{t}$. These probabilities satisfy standard properties since $v + \mathrm{t} > f + \mathrm{t} > 0$ and because $v < \mathrm{t}$ by assumption.
[11] We disregard the possible existence of a pooling equilibrium in stage 1 of the model by arguing that a pooling equilibrium is unstable (see also Section 3.1).

Since the threshold C plays an important role in the determination of the type of advisors appointed by the ministers in equilibrium it is worth considering how C varies with the parameter s. In Appendix B, we also derive the next proposition.

Proposition 2. *The value of C increases with s.*

Using Propositions 1 and 2 and that $b_{\mathrm{C}}^{*} = 1\frac{1}{2}v - \frac{1}{2}\mathrm{t}$ the following proposition can be obtained straightforwardly which shows that the relative positions of the players' preferences are crucial to understand whether polarised or consensual policy advice occurs.

Proposition 3. *Given that $f < v < s < t$, if s is high, and if v is low, polarisation of policy advice occurs; otherwise consensus holds.*

Proposition 3 reveals that if the predispositions of the finance minister and of the median voter are very similar, different advisors are selected. This is intuitively very appealing. We argued before that communication between $\mathrm{B_F}$ and V is a prerequisite. If f and v are close, the finance minister can appoint his ideal advisor with $b_{\mathrm{F}} = f$, who is able to transmit relevant information about the project X to the voter and who assures perfect alignment of preferences with the finance minister. In that case polarisation of policy advice occurs. In contrast, if V and S are both highly in favour of the project (v and s are high), whereas f is relatively low, the finance minister needs to ensure communication between $\mathrm{B_F}$ and V by choosing $b_{\mathrm{F}} = b_{\mathrm{C}}^{*}$. As a consequence both ministers choose similar advisors.

Furthermore, if the spending minister is very predisposed in favour of executing the project X, relative to the preferences of F and V the ministers choose different advisors. If the project is very appealing to S a priori, it is more difficult for S than for F to convince V of the merits of implementing X and polarisation of policy advice occurs.

Table 2 summarises the beliefs about ε and μ and the strategies of the players in a partially pooling equilibrium. Note that the nature of the resulting outcome in equilibrium depends on the underlying parameters of the model.

Several features of the equilibrium presented in Table 2 are worth considering. First, note that the project will be approved by the median voter ($X = 1$) only if both advisors recommend that the project should be undertaken (i.e. $m_{\mathrm{S}} = Y_{\mathrm{S}}$ and $m_{\mathrm{F}} = Y_{\mathrm{F}}$). Secondly, the posterior beliefs depend on the messages send by the advisors. This means that their messages communicate information to the five players in the game. Finally, in some instances F is able to appoint an advisor whose predispostion coincides with F's. This happens if information provided by $\mathrm{B_F}$ induces the median voter to take decisions that are in accordance with the finance minister's preferences. Perfect alignment of predispositions is attractive for F.

Resuming, the game analysed in this paper has one unique stable perfect Bayesian equilibrium. Depending on the parameters of the model, in particular those reflecting the preferences of the various players, the ministers either choose different types of policy advisors (i.e. polarisation) or choose the same

Table 2. Equilibrium strategies and beliefs of the game

$$\text{Beliefs}\begin{cases} E(\varepsilon|m_S = Y_S) = \frac{1}{3}(\mathrm{t} - 2b_S + b_F) \\ E(\varepsilon|m_S = N_S) = -\frac{1}{3}(2\mathrm{t} + 2b_S - b_F) \\ E(\mu|m_F = Y_F) = \frac{1}{3}(\mathrm{t} - 2b_F + b_S) \\ E(\mu|m_F = N_F) = -\frac{1}{3}(2\mathrm{t} + 2b_F - b_S) \end{cases}$$

$$\text{Player V}\begin{cases} X = 1 & \text{if } m_S = Y_S \wedge m_F = Y_F \\ X = 0 & \text{if } m_S = Y_S \wedge m_F = N_F \end{cases}$$

$$\text{Player B}_\text{S}\begin{cases} m_S = Y_S & \text{if } \varepsilon \geq -\frac{4}{3}b_S + \frac{2}{3}b_F - \frac{1}{3}\mathrm{t} \\ m_S = N_S & \text{otherwise} \end{cases}$$

$$\text{Player B}_\text{F}\begin{cases} m_F = Y_F & \text{if } \mu \geq -\frac{4}{3}b_F + \frac{2}{3}b_S - \frac{1}{3}\mathrm{t} \\ m_F = N_F & \text{otherwise} \end{cases}$$

$$\text{Definitions:}\begin{cases} b_S^* = \mathrm{t} + s + \frac{1}{2}f - \sqrt{\left(\mathrm{t} + \frac{1}{2}s\right)^2 + \frac{3}{4}(f - s)^2} \\ b_c^* = 1\frac{1}{2}v - \frac{1}{2}\mathrm{t} \end{cases}$$

$$\text{Player S}\begin{cases} \text{if } m_S = Y_S, \text{ propose the project, otherwise end the game} \\ \text{if } b_c^* \leq C \text{ then } b_S = b_S^* \text{ otherwise } b_S = b_C^* \end{cases}$$

$$\text{Player F}\begin{cases} \text{if } b_c^* \leq C \text{ then } b_F = f \\ \text{otherwise } b_F = b_c^* \end{cases}$$

type of policy advisor (i.e. consensus). Uniqueness of the equilibrium is due to the fact that if a partially pooling equilibrium exists in which the advisor can communicate useful information about the desirability of the project, a pooling equilibrium is unstable, as we argued before in Sect. 3.1.

5 The extent of polarisation: Comparative static results

Against the background of the objectives of the paper, it is useful to examine the properties of b_S^*. We first consider the value of b_s^* relative to f and s. The proof of Proposition 4 can be found in Appendix C.

Proposition 4. *If $b_F = f$, then $f < b_S^* < s < t$*

This proposition states that if the finance minister appoints researchers whose predispositions coincide with that of himself, the spending minister will consult researchers, who are more biased towards the project than the finance minister, but less biased as the spending minister himself. To provide an intuition for this result recall that we assume here that the research staff of the finance minister is able to persuade the median voter of parliament and hence, chooses $b_{\mathrm{F}} = f$. Consider now the problem the spending minister faces. Basically, there are two reasons why a spending minister wants to consult experts. First, the spending minister wants to avoid undertaking the project if the project does not benefit him. If this were the only reason for consulting experts, the spending minister would appoint researchers, whose predispositions coincide with that of himself.

Secondly, the spending minister consults experts to persuade other political agents to support a proposal to undertake the project. Since in the present case the message of the research staff of the finance minister is decisive, this is the player who must be persuaded. If the research staff of the finance minister inferred all information about the project from the message of the research staff of the spending minister, the spending minister would appoint researchers whose advise exactly would persuade the research staff to support the proposal. However, the research staff of the finance minister possesses private information about the consequences of the project. Due to this, the research staff of the spending minister is uncertain about the effect of a recommendation to undertake the project on the action of the research staff of the finance minister. This makes that when appointing researchers, the spending minister faces a trade-off between acquiring information about the consequences of the project and using experts to persuade other players to support a proposal to undertake the project. To acquire information, the spending minister wants to appoint a researcher whose predisposition is equal to that of himself, but to convince the research staff of the finance minister, he can raise credibility of the message of his research staff, by appointing researchers whose predispositions are close to that of those of the researchers of the finance minister. Due to this, the spending minister will appoint researchers who are more biased towards the project than the researchers of the finance minister.

Let us now consider the effects of s, f and t on b_{S}^{*}. The proof of the following proposition is extended to Appendix D.

Proposition 5. *If $b_F = f$, then b_S^* increases with s, f and t.*

The comparative static results indicated in Proposition 5 show again that the spending minister faces a trade-off. First, an increase in s induces the spending minister to select an advisor with a higher predisposition towards the project, in order to induce decisions he favours. Secondly, a rise in f reduces the conflict of interest between the finance and the spending minister. Hence, the benefits of providing information to the finance minister decrease, implying that the spending minister is inclined to increase b_{S}. Thirdly, a higher t implies that uncertainty increases as to the effects of the advisor's message to undertake the project on the research staff of the finance minister. Hence, the spending minister becomes more uncertain about whether communication arises between the two distinct research staffs. Accordingly, the benefits to persuade the researchers of the finance minister decrease and as a result the spending minister has an incentive to choose a higher b_S.

6 Discussion

Advisors may serve several purposes. In the first place advisors are consulted to acquire information about the merits of a certain decision, in order to prevent mistakes. Secondly, recommendations provided by advisors may be used to obtain political support or to advance legitimacy of decisions. These two aspects of advice are incorporated in the model analysed in this paper. The analysis revolves around the implementation of a project of which the consequences are uncertain in two respects. Both a spending and a finance minister who have conflicting interests can appoint one research staff, which is specialised in assessing one type of the policy consequences. For instance, the research staff either investigates the environmental or budgetary consequences of the decision, but not both. Ultimately, the median voter in parliament decides whether or not the project is worth implementing. The preferences of the median voter lie between the preferences of the spending and finance minister.

Using game theoretical arguments we have shown that in principle, a minister wants to appoint advisors whose preferences are aligned to the minister's own predisposition towards the project. However, each minister realises that his research staff needs to persuade the median voter in parliament and possibly the research staff of the other minister. This provides an incentive to appoint an advisor whose preferences are closer to the preferences of the agents that have to be persuaded, in order to enhance credibility of the messenger.

Furthermore, we have shown that depending on the parameters of the model in equilibrium either polarised or consensual policy advice appears. Polarised advice refers to a situation where the ministers select advisors whose preferences differ. In contrast, consensual policy advice appears if the ministers choose research staffs that have the same predisposition to the project.

The model developed in this paper stresses the importance of persuasion. This feature of our model may be relevant in other areas of decision making. For instance managers of firms may have to convince the board of directors or shareholders about the necessity of undertaking an investment project instead of paying out dividends that were promised previously. Alternatively, firms may have to convince trade unions about the desirability of reorganisations in order to avoid disruption to production due to strikes. Persuasion to obtain support for certain decisions is common practice.

The model presented in this paper employs various rather special assumptions. Hence several extensions of the analysis are worth investigating. First, we have assumed that advisors do not require payments. In our model the advisors are purely policy motivated. We conjecture that our results remain valid as long as payments are not contingent on the realisation of the stochastic variables and as long as the benefits of advice to the ministers exceed the costs. Secondly, we did not study a repeated version of the game. This would introduce reputational and career considerations for both advisors and ministers. Thirdly, we have assumed a very simple setting in which ministers can only appoint one specialised advisor. If a minister were able to select two advisors with different preference parameters, the minister may obtain more information even if they are both restricted to say "yes" (i.e. Y) or "no" (i.e. N) and have information on the same stochastic variable. The message space would then be (Y, Y), (Y, N), (N, N) and (N, Y). Finally, we assumed that knowledge of an advisor and messages were not verifiable. For instance, we assumed that the median voter was not allowed to appoint an advisor. Presumably, these extensions will qualify our results.

Appendix A

Proof. $b_S \in (\max(\frac{1}{2}f - \mathrm{t}, 2f - \mathrm{t}), \min(\frac{1}{2}(\mathrm{t}+\mathrm{f}), 2(\mathrm{t}+\mathrm{f})))$

Since $(f + \mathrm{t}) > 0$ by assumption, we have to show that

$$b_S^* < \frac{1}{2}(\mathrm{t} + f) \tag{A1}$$

$$b_S^* > \frac{1}{2}f - \mathrm{t} \tag{A2}$$

$$b_S^* > 2f - \mathrm{t} \tag{A3}$$

Using Eq. (14) define $\mathrm{V}(b_S)$:

$$V(b_S) = 2b_S^2 - 2(2\mathrm{t} + 2s + f)b_S + 2s\mathrm{t} - f^2 + 2\mathrm{t}f + 5sf$$

Since $\mathrm{s} < \mathrm{t}$, if $b_S^* < \frac{1}{2}(s+f)$, then (A1) is satisfied. This requires $\mathrm{V}(\frac{1}{2}(s+f)) < 0$. After some straightforward algebra it follows that

$$V\left(\frac{1}{2}(s+f)\right) = -1\frac{1}{2}(s-f)^2 < 0$$

Eq. (A2) requires $\mathrm{V}(\frac{1}{2}\mathrm{f} - \mathrm{t}) > 0$. It can be shown that

$$V\left(\frac{1}{2}f - \mathrm{t}\right) = 4\frac{1}{2}\mathrm{t}^2 + 1\frac{1}{2}(\mathrm{t}^2 - f^2) + 3s(\mathrm{t} + f) + 3st > 0$$

Eq. (A3) requires $\mathrm{V}(2f - \mathrm{t}) > 0$. Rearranging the corresponding expression gives

$$V(2f - \mathrm{t}) = 3[(f - \mathrm{t})^2 + 2\mathrm{t}(s - f) + t^2 - sf] > 0$$

Appendix B

Proof Proposition 1. An important feature of our model is that the advisor who is appointed by the finance minister must be able to communicate information to the median voter. In fact equation (6) reflects this notion and indicates that communication between the advisor of the finance minister and the median voter occurs if the inequality $E(\pi_V|m_{\mathrm{F}} = N_{\mathrm{F}}) \leq 0$ is satisfied. Hence, using (3), (4) and (11) the choice of the two research staffs, b_{S} and b_{F}, must imply:

$$2v - \frac{2}{3}(b_F + \mathrm{t} + b_S) \leq 0 \tag{B1}$$

First note that if $(b_{\mathrm{S}} = b_{\mathrm{F}} = b_{\mathrm{c}}^*)$ this condition holds. Second, the spending minister may either choose $b_{\mathrm{S}} = b_{\mathrm{S}}^*$ or $b_{\mathrm{S}} = b_{\mathrm{c}}^*$. However, in principle the finance minister wants to choose a research staff with $b_{\mathrm{F}} = f$, if the information this advisor provides convinces the median voter. From (18) and (B1) it follows that S cannot choose $b_{\mathrm{S}} = b_{\mathrm{c}}^*$ if $b_{\mathrm{c}}^* \leq f$, because if F chooses $b_{\mathrm{F}} = f$ in response, this advisor $\mathrm{B_F}$ convinces the median voter. As a consequence $b_{\mathrm{S}} = b_{\mathrm{S}}^*$ and $b_{\mathrm{F}} = f$ are selected by the ministers if $b_{\mathrm{c}}^* \leq f$. Furthermore, according to equation (B1), $b_{\mathrm{S}} = b_{\mathrm{S}}^*$ and $b_{\mathrm{F}} = f$ cannot be chosen if $b_{\mathrm{c}}^* > \frac{1}{2}(f + b_{\mathrm{S}}^*)$. Then the spending and finance minister choose $b_{\mathrm{S}} = b_{\mathrm{F}} = b_{\mathrm{c}}^*$.

The preceeding discussion implies that if the parameters satisfy $f < b_{\mathrm{c}}^* \leq \frac{1}{2}(f + b_{\mathrm{S}}^*)$ the spending minister may either choose $b_{\mathrm{S}} = b_{\mathrm{S}}^*$ or $b_{\mathrm{S}} = b_{\mathrm{c}}^*$ and both options are feasible. Obviously, since the spending minister moves first in our game, he chooses b_{S} to maximise expected utility. In that case the spending minister may select an outcome that yields him highest utility. We first define $W(b_{\mathrm{S}}^*)$ and $W(b_{\mathrm{c}}^*)$. The expressions for $W(b_{\mathrm{S}}^*)$ and $W(b_{\mathrm{c}}^*)$ correspond to the spending minister's utility derived under the polarisation and consensus outcome, respectively.

$$W(b_S^*) = (2\mathrm{t} + 2b_S^* - f)(2\mathrm{t} + 2f - b_S^*)\left(s + \frac{2}{3}\mathrm{t} - \frac{1}{3}b_S^* - \frac{1}{3}f\right) \tag{B2}$$

$$W(b_c^*) = (2\mathrm{t} + b_c^*)^2\left(s + \frac{2}{3}\mathrm{t} - \frac{2}{3}b_c^*\right) \tag{B3}$$

Hence, S chooses $b_{\mathrm{S}} = b_{\mathrm{S}}^*$ if $W(b_{\mathrm{S}}^*) > W(b_{\mathrm{c}}^*)$ otherwise he chooses $b_{\mathrm{S}} = b_{\mathrm{c}}^*$. Suppose now that $b_{\mathrm{c}}^* = f$. Then $W(b_{\mathrm{S}}^* = f) = W(b_{\mathrm{c}}^* = f)$. Obviously, if b_{S}^* is derived under unconstrained optimisation (in appendix C we show that $b_{\mathrm{S}}^* > f$) then $W(b_{\mathrm{S}}^*) > W(b_{\mathrm{c}}^*)$. Suppose now that $b_{\mathrm{c}}^* = \frac{1}{2}(b_{\mathrm{S}}^* + f)$. This implies $b_{\mathrm{S}}^* = 2b_{\mathrm{c}}^* - f$. Using (B1) yields

$$W(b_S^* = 2b_c^* - f) = (4\mathrm{t}^2 + 4\mathrm{t}b_c^* - 8(b_c^* - f)^2 + (2b_c^* - f)f)\left(s + \frac{2}{3}t - \frac{2}{3}b_c^*\right) \tag{B4}$$

Since

$$(b_c^*)^2 + 8(b_c^* - f)^2 - (2b_c^* - f)f = 9(b_c^* - f)^2 > 0 \tag{B5}$$

comparing (B2) and (B3) yields that $W(b_S^*) < W(b_c^*)$ if $b_c^* = \frac{1}{2}(b_S^* + f)$. Since $\partial W(b_c^*)/\partial b_c^* = 2(2t + b_c^*)(s - b_c^*) > 0$, $W(b_c^* = f) < W(b_S^*)$ and $W(b_c^* = \frac{1}{2}(b_S^* + f)) > W(b_S^*)$ there exists a $C \in (f, \frac{1}{2}(b_S^* + f))$ such that $W(b_c^* = C) = W(b_S^*)$. We argued before that for $b_c^* < f$, $b_S = b_S^*$ and $b_F = f$ are chosen in equilibrium. Furthermore, it is shown that for $b_c^* > \frac{1}{2}(f + b_S^*)$, $b_S = b_F = b_c^*$ are selected in equilibrium. It follows immediately from the above discussion that for $b_c^* < C$, $b_S = b_S^*$ and $b_F = f$ are chosen. Otherwise, $b_S = b_F = b_c^*$ are selected.

Proof Proposition 2. Note that C is implicitly determined by the equality

$$\begin{aligned}(4t^2 + 4Ct + C^2)&\left(s + \frac{2}{3}t - \frac{2}{3}C\right)\\ &= (4t^2 + 2tf + 2b_S^*t + 5b_S^*f - 2(b_S^*)^2 - 2f^2)\left(s + \frac{2}{3}t - \frac{1}{3}b_S^* - \frac{1}{3}f\right)\end{aligned} \tag{B6}$$

Hence,

$$\begin{aligned}(4t + 2C)&\left(s + \frac{2}{3}t - \frac{2}{3}C\right)\frac{\partial C}{\partial s} + (4t^2 + 4Ct + C^2)\left(1 - \frac{2}{3}\frac{\partial C}{\partial s}\right)\\ &= \frac{\partial W(b_S^*)}{\partial b_S^*}\frac{\partial b_S^*}{\partial s} + 4t^2 + 2tf + 2b_S^*t + 5b_S^*f - 2(b_S^*)^2 - 2f^2\end{aligned} \tag{B7}$$

Collecting terms, using that $\partial W(b_S^*)/\partial b_S^*$ equals zero and using Eq. (B5) it follows that

$$2\frac{\partial C}{\partial s}(2t + C)(s - C) = (4t^2 + 4Ct + C^2)\left[\frac{s + \frac{2}{3}t - \frac{2}{3}C}{s + \frac{2}{3}t - \frac{1}{3}b_S^* - \frac{1}{3}f} - 1\right] > 0$$

Note that $(4t^2 + 4Ct + C^2) = (2t + C)^2$. Since $s > C$ and $2t + C > 0$, we obtain $\partial C/\partial s > 0$.

Appendix C

Proof Proposition 4. We have to prove that $b_S^* > f$ and $b_S^* < s < t$, which requires that $V(f) > 0$ and that $V(s) < 0$, respectively, where $V(-)$ is as defined in Appendix A. Straightforward algebra reveals that

- $V(f) = (s - f)(f + 2t) > 0$.
- $V(s) = -(s - f)(2s + 2t - f) < 0$.

Appendix D

Proof Proposition 5. The term b_S^* is implicitly determined by Eq. (14). Differentiating (14) with respect to f, s and t yields:

$$(4b_S^* - 4\mathrm{t} - 4s - 2f)\frac{\partial b_S^*}{\partial f} = 2b_S^* + 2f - 2\mathrm{t} - 5s \tag{D1}$$

$$(4b_S^* - 4\mathrm{t} - 4s - 2f)\frac{\partial b_s^*}{\partial s} = 4b_S^* - 2\mathrm{t} - 5f \tag{D2}$$

$$(4b_S^* - 4\mathrm{t} - 4s - 2f)\frac{\partial b_S^*}{\partial \mathrm{t}} = 4b_S^* - 2s - 2f \tag{D3}$$

respectively. The second order condition implies that $4b_S^* - 4\mathrm{t} - 4s - 2f < 0$. Therefore, we have to show that $b_S^* < \mathrm{t} - f + 2\frac{1}{2}s$, $b_S^* < \frac{1}{2}\mathrm{t} + 1\frac{1}{4}f$ and $b_S^* < \frac{1}{2}(s+f)$.

- Since $\mathrm{t} - f + 2\frac{1}{2}s > \mathrm{t} - s + 2\frac{1}{2}s = \mathrm{t} + 1\frac{1}{2}s > \mathrm{t}$, and $b_S^* < s < \mathrm{t}$ (see Appendix C), we have $b_S^* < \mathrm{t} - f + 2\frac{1}{2}s$.
- We have to show $\mathrm{V}(\frac{1}{2}\mathrm{t} + 1\frac{1}{4}f) < 0$. It can be shown in a straightforward manner that $\mathrm{V}(\frac{1}{2}\mathrm{t} + 1\frac{1}{4}f) = -1\frac{1}{2}(\mathrm{t} + \frac{1}{2}f)^2 < 0$
- Recall that in Appendix A we have shown that $b_S^* < \frac{1}{2}(s+f)$.

Appendix E

$E(\pi_V | m_F = Y_F) > 0$ requires $v + \frac{2}{3}\mathrm{t} - \frac{1}{3}(b_S + b_F) > 0$. This must be checked for both the polarisation and consensus outcome.

- If $b_S = b_F = b_c^* = 1\frac{1}{2}v - \frac{1}{2}\mathrm{t}$ then $v + \frac{2}{3}\mathrm{t} - \frac{2}{3}(1\frac{1}{2}v - \frac{1}{2}\mathrm{t}) = \frac{1}{3}\mathrm{t} > 0$
- If $b_S = b_S^*$ and $b_f = f$ then $v + \frac{2}{3}\mathrm{t} - \frac{1}{3}(b_S^* + f) > f + \frac{2}{3}\mathrm{t} - \frac{1}{3}(b_S^* + f) = \frac{1}{3}(2(f + \mathrm{t}) - b_S^*) > 0$ since $b_S^* < \frac{1}{2}(\mathrm{t} + f) < 2(\mathrm{t} + f)$ as shown in Appendix A.

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