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TWO-SIDED UNCERTAINTY IN THE MONOPOLY AGENDA SETTER MODEL*

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MONOPOLY AGENDA SETTER MODEL

1. Introduction

In the field of political economy the monopoly agenda setter model of Romer and Rosenthal (1978),(1979) has become an established alternative to the standard Downsian paradigm of electoral competition. Models in the latter category typically generate median voter–type results concerning the equilibrium policy outcome, due to the explicit competition among agents for the role as a constituency's representative. The Romer–Rosenthal (1978),(1979) model assumes such a representative has already been selected, and endows this individual with the ability to "set" the voting agenda by offering her constituency a choice between the status quo outcome and an outcome selected by the representative. Assuming the preferences of the agenda setter and voters do not coincide, the relevant question concerns the ability of the setter to bias the final policy outcome in her favor relative to the voters' wishes. Romer and Rosenthal (1978),(1979) derive an equilibrium prediction which demonstrates this bias as a function of the status quo outcome, in particular generating a negative relationship between the status quo and the final outcome for levels of the status quo below the median voter's ideal outcome.

A natural question that arises from this analysis is why the voters would permit the setter this degree of autonomy in the decision process. One plausible answer is that once in office the representative gains some information concerning the relevant parameters of a problem, implying this degree of autonomy may be an efficient means of distributing influence. In Banks (1989) the Romer–Rosenthal (1978),(1979) model is extended to an environment where only the agenda setter knows with certainty the value of the status quo proposal. The proposal by the setter now potentially plays an informational role in the process, in that the proposal may "signal" the true value of the status quo to the voters, thereby augmenting their ex ante information. However Banks (1989) shows that this informational role turns out to be quite limited, in that the setter never reveals completely the value of the status quo and subsequently has this "revealing" proposal accepted.

In the current paper we extend the analysis in Banks (1989) to an environment where the setter lacks some crucial information as well. In particular, we assume the setter is uncertain as to the location of the median voter's ideal policy outcome, which is the principal determinant in the setter's decision calculus. Given the sequence of events, the voters do not have the opportunity to signal this information to the setter; yet it turns out that even without this potential for signaling the setter's uncertainty concerning the voters' preferences will dramatically alter the earlier results. The main result of the paper (Theorem 1) establishes the existence and uniqueness of a separating equilibrium, thereby demonstrating the ability of the setter to credibly transmit all of the relevant information to the voters through the proposal process. Further, this separating equilibrium is the only equilibrium satisfying the refinement of universal divinity (Theorem 2). In addition, the separating proposal is always less than the proposal made by the setter if the status quo were known the voters, implying a downward pressure on the setter's proposal by the presence of asymmetric information concerning the status quo.

Therefore this paper establishes the sensitivity of the results in Banks (1989) to the assumption of complete information concerning the voter's preferences: with a little bit of uncertainty there will exist the incentives for the setter to separate in her proposal, whereas without this uncertainty no such incentives exist.

2. The model

The model concerns the interaction between an agenda setter or bureaucrat, S, and a (median) voter, V, in the determination of a policy outcome from $\mathbb{R}$. The setter's preferences over $\mathbb{R}$ are represented by a continuously differentiable strictly increasing and concave utility function $u_S(\cdot)$, $\partial u_S/\partial x > 0$, $\partial^2 u_S/\partial x^2 < 0$. The voter's preferences are quadratic about an ideal outcome v, $u_V(x;v) = -(x-v)^2$.

The sequence of actions is as follows: S makes a proposal of $p \in \mathbb{R}$, which V can either accept, in which case p becomes the final outcome, or reject, in which case the "status quo" outcome $s \in \mathbb{R}$ is implemented. Thus the setter has the ability to make a "take–it–or–leave–it" offer to the voter, as in the original Romer–Rosenthal (1978),(1979) model.

The informational assumptions are that prior to the play of the game only the setter knows the value of the status quo s, while only the voter knows the voter's ideal policy outcome v. Let $[\underline{s},\overline{s}]$ denote the set of possible values of the status quo, or equivalently the set of "types" of the setter, where the distribution $F(\cdot)$ describes the voter's common knowledge prior belief about the status quo; $F(\cdot)$ is continuously differentiable and $\partial F/\partial s \equiv f(s) > 0$ iff $s \in [\underline{s},\overline{s}]$. The set of possible values for v is taken to be the entire real line; let $G(\cdot)$ be the continuously differentiable common knowledge distribution from which v is drawn, where $\partial G/\partial v \equiv g(v) > 0 \ \forall \ v \in \mathbb{R}$. These informational assumptions differ from Romer–Rosenthal (1978),(1979), where both s and v are common knowledge, Banks (1989), where v is common knowledge but s is private information, and Morton (1987), where s is common knowledge but v is private.

Given this informational structure a <u>proposal strategy</u> for S is a function

$$\pi : [\underline{s},\bar{s}] \longrightarrow \mathbb{R},$$

where $p = \pi(s)$ is the proposal of a setter of type s. A <u>response strategy</u> for V is a function

$$r : \mathbb{R} \times \mathbb{R} \longrightarrow \{a_1,a_2\},$$

where $r(p,v) = a_1$ denotes acceptance of the proposal p given ideal policy v, and $r(p,v) = a_2$ denotes rejection (we argue below why the assumption of a pure strategy response by V is without loss of generality). For $j = 1,2$ define $X_j(p) \equiv \{v \in \mathbb{R} : r(p,v) = a_j\}$.

The expected utility for S from proposing p, given type s and response strategy r by V, defined $U_S(s,p,r)$, is then

$$U_S(s,p,r) = \int_{X_1(p)} u_S(p)\cdot dG(v) + \int_{X_2(p)} u_S(s)\cdot dG(v). \qquad (1)$$

For V, the expected payoff from accepting a proposal of p is simply $u_V(p)$, while if V rejects p and has beliefs $\mu(\cdot)$ concerning the true value of the status quo the expected payoff is $u_V(s_\mu) - \sigma^2_\mu$, where s_μ is the mean and σ^2_μ the variance associated with the belief μ. The voter's best response correspondence, BR( ), is then

$$BR(p,\mu,v) = \begin{cases} a_1 & \text{if } v > v(p,\mu) \\ \{a_1,a_2\} & \text{if } v = v(p,\mu) \ , \\ a_2 & \text{if } v < v(p,\mu) \end{cases} \qquad (2)$$

where $v(p,\mu)$, the indifferent voter type, solves

$$v = (s_\mu + p)/2 + \sigma_\mu^2/[2(s_\mu - p)]. \tag{3}$$

Thus given beliefs μ at proposal p, if $v = v(p,\mu)$ the voter is indifferent between accepting and rejecting p, while if $v > v(p,\mu)$ the voter prefers to accept p and if $v < v(p,\mu)$ the voter prefers to reject p.

In the next section we will consider some properties of the sequential equilibria [Kreps and Wilson (1982)] of this model, where a sequential equilibrium consists of a proposal strategy $\pi(\cdot)$, a response strategy $r(\cdot)$, and a function $\mu(\cdot)$ describing the voter's beliefs about the setter's type as a function of the proposal. In general these beliefs may be a function of the voter's type v as well; however since the players' types (s,v) are assumed to be drawn independently, the consistency condition of sequential equilibria implies the voter's beliefs will be independent of v. Consistency requires the beliefs of the voter be the limit of a sequence of beliefs derived via Bayes' Rule from a sequence of completely mixed strategies by the setter, where this sequence of strategies is independent of v and converges to the equilibrium strategy. Bayes' Rule then is applicable all along the sequence, thereby generating a sequence of beliefs which is independent of the voter's ideal policy v.

Therefore without loss of generality we can characterize a strategy for V as simply a function $\hat{r} : \mathbb{R} \longrightarrow \mathbb{R}$ identifying the indifferent voter type for each proposal, so that if $v < \hat{r}(p)$ the voter rejects p while if $v > \hat{r}(p)$ the voter accepts. The equilibrium condition for V is now the following: for all p $\in \mathbb{R}$ and given beliefs $\mu(p)$, $\hat{r}(p) = v(p,\mu(p))$.

With this notation the expected utility of the setter from proposing p, given voter strategy $\hat{r}$, is

$$U_S(s,p,\hat{r}) = G(\hat{r}(p))\cdot u_S(s) + [1 - G(\hat{r}(p))]\cdot u_S(p), \tag{4}$$

which is utility–equivalent (Myerson (1985)), and hence behaviorally equivalent, to

$$\tilde{U}_S(s,p,\hat{r}) = [1 - G(\hat{r}(p))]\cdot[u_S(p) - u_S(s)]. \quad (5)$$

Since $\tilde{U}_S(\cdot)$ requires less notation than $U_S(\cdot)$ we will use $\tilde{U}_S(\cdot)$ as our measure of the setter's preferences.

Definition. A sequential equilibrium is a strategy pair $(\pi^*,\hat{r}^*)$, and a system of beliefs μ^*, such that, i) $\forall$ s $\in$ $[\underline{s},\bar{s}]$, $\pi^*(s)$ maximizes $\tilde{U}_S(s,p,\hat{r}^*)$, ii) $\forall$ p $\in \mathbb{R}$, $\hat{r}^*(p) = v(p,\mu^*(p))$, and iii) if $\pi^{*-1}(p) \neq \phi$, then $\mu(p)$ is derived via Bayes' Rule according to the strategy π^* and the prior belief $F(\cdot)$.

Let Σ denote the set of strategy pairs $(\pi,\hat{r})$ such that there exists beliefs μ where $(\pi,\hat{r},\mu)$ constitutes a sequential equilibrium, and for all $(\pi,\hat{r}) \in \Sigma$ define $\lambda(s;\pi,\hat{r}) = [1 - G(\hat{r}(\pi(s)))]$ as the probability a type s setter's equilibrium proposal is accepted.

3. Results

Our first result states some general properties of sequential equilibrium strategies.

Lemma 1. $\forall$ $(\pi,\hat{r}) \in \Sigma$,

i) $\pi(\cdot)$ is weakly increasing in s, and $\forall$ s $\pi(s) > s$;

ii) $\lambda(\cdot)$ is weakly decreasing in s, and $\forall$ s $\lambda(s) > 0$.

Proof. The assumptions $g(v) > 0 \; \forall \; v \in \mathbb{R}$ and $\bar{s} < \infty$ imply there exists a proposal $p > \bar{s}$ such that the voter accepts p for some values of v and for <u>any</u> beliefs μ; therefore $\pi(s) > s$ and $\lambda(s) > 0$ follow from individual rationality. To see the monotonicity results, let $s > s'$, and define $p = \pi(s)$, $p' = \pi(s')$, $\lambda = \lambda(s)$ and $\lambda' = \lambda(s')$. Then incentive compatibility, which is a necessary condition for an equilibrium [cf. Banks (1990)], implies

$$\lambda \cdot [u_S(p) - u_S(s)] \geq \lambda' \cdot [u_S(p') - u_S(s)] \tag{6}$$

$$\lambda' \cdot [u_S(p') - u_S(s')] \geq \lambda \cdot [u_S(p) - u_S(s')]. \tag{7}$$

Subtracting the RHS of (7) from the LHS of (6), and the LHS of (7) from the RHS of (6), we get

$$\lambda \cdot [u_S(s') - u_S(s)] \geq \lambda' \cdot [u_S(s') - u_S(s)]. \tag{8}$$

Since $u_S(\cdot)$ is strictly increasing and $s > s'$, this implies $\lambda' \geq \lambda$, thus proving ii). Since $\lambda(\cdot) > 0$,equations (6) and (7) also imply

$$\frac{u_S(p') - u_S(s')}{u_S(p) - u_S(s')} \geq \frac{u_S(p') - u_S(s)}{u_S(p) - u_S(s)} . \tag{9}$$

Cross–multiplying and canceling terms, we get

$$u_S(p) \cdot [u_S(s) - u_S(s')] \geq u_S(p') \cdot [u_S(s) - u_S(s')], \tag{10}$$

implying $p \geq p'$ and thus proving i). QED

The increasing nature of $\pi(\cdot)$ is in contrast to the complete information model of Romer and Rosenthal (1978),(1979) where the equilibrium proposals are strictly decreasing for status quo outcomes less than the voter's ideal outcome. The logic in Romer and Rosenthal (1978),(1979) is based on the single–peaked nature of the voter's preferences: if $v = 0$ and $s < 0$, then the voter will accept any proposal between s and $-$ s; therefore in equilibrium S proposes $-$ s, which V accepts with probability 1. With incomplete information on the other hand the monotonicity result is driven by the preferences and incentives of the setter; the single–peaked nature of the voter's preferences is not at all consequential.

Banks (1989) shows that if $G(\cdot)$ is degenerate with a single mass point then in any sequential equilibrium there exists at most two proposals which are accepted with positive probability; further if one requires universal divinity [Banks and Sobel (1987)] the equilibrium must have a single accepted proposal, a proposal which is made by all types less than this proposal. Therefore $\pi(\cdot)$ is flat for those types whose proposal is accepted, implying the amount of information revealed by the proposal process is quite coarse. In addition, there exists a continuum of such equilibria, implying only weak comparisons between equilibrium outcomes with complete vs. incomplete information. Theorem 1 below demonstrates the sensitivity of this result to the assumption of known voter preferences by establishing the existence of a separating equilibrium in the current environment.

Consider first the optimal proposal by the setter if the status quo s were known to the voter. Then $v(p,\mu) = (p + s)/2$, and the equilibrium proposal by the setter, which we denote $\pi^c(s)$, solves

$$\max_p \quad [1 - G((p+s)/2)]\cdot[u_S(p) - u_S(s)]. \tag{11}$$

Suppose we assume the hazard rate associated with the distribution G, $g(v)/[1 - G(v)]$, in non–decreasing in v; this plus the concavity of u_S insures the solution to eq. (11) is unique.

Theorem 1. There exists a unique separating sequential equilibrium strategy π^*, which satisfies the following differential equation:

$$\frac{\partial\pi^*}{\partial s} = \frac{M^*(s)}{N^*(s) - M^*(s)}, \text{ where} \tag{12}$$

$$M^*(s) = g((\pi^*(s)+s)/2)\cdot[u_S(\pi^*(s)) - u_S(s)],$$
$$N^*(s) = 2\cdot[1 - G((\pi^*(s)+s)/2)]\cdot(\partial u_S(\pi^*(s))/\partial p).$$

Further, $\pi^*(\bar{s}) = \pi^c(\bar{s})$ and for all $s \in [\underline{s},\bar{s})$ $\pi^*(s) < \pi^c(s)$.

Proof. Let

$$W(s,s',p) \equiv [1 - G((p+s')/2)]\cdot[u_S(p) - u_S(s)]$$

denote the setter's expected utility from proposing p, given type s and given the voter believes S to be type s′, and let subscripts on W(·) denote partial derivatives. Given a strictly monotonic strategy $\pi(\cdot)$, if we substitute $\pi(s')$ into $W(s,s',p)$ we get the setter's expected utility from imitating type s′ given true type s. Incentive compatibility implies that if $(\pi,\hat{r}) \in \Sigma$, then $\forall$ $s,s' \in [\underline{s},\bar{s}]$, $W(s,s,\pi(s)) \geq W(s,s',\pi(s'))$. Since this holds with equality at $s' = s$, we get the following "local" incentive compatibility condition:

$$\frac{\partial W(s,s',\pi(s'))}{\partial s'}\Big|_{s'=s} = W_2(s,s,\pi(s)) + W_3(s,s,\pi(s))\cdot\frac{\partial \pi}{\partial s} = 0, \tag{13}$$

implying

$$\frac{\partial \pi}{\partial s} = -\frac{W_2(s,s,\pi(s))}{W_3(s,s,\pi(s))}, \tag{14}$$

which is simply eq. (12) when $\pi(\cdot)$ is strictly monotonic, ie. separating. To show that the model admits a strictly increasing solution to eq. (14), and therefore this condition is sufficient for an equilibrium, we employ results due to Mailath (1987). Mailath (1987) shows the following conditions to be sufficient for existence and uniqueness of a separating equilibrium:

i) W is twice continuously differentiable on $[\underline{s},\bar{s}]^2 \times \mathbb{R}$; in the current model this follows from the assumptions on $G(\cdot)$.

ii) W_2 is never zero, and so is either positive or negative; here

$$W_2 = -[u_S(p) - u_S(s)]\cdot g((p+s)/2), \tag{15}$$

and so $W_2 < 0$ on the "relevant region" of proposals for each type, ie. for $p > s$.

iii) W_{13} is never zero, and so is either positive or negative; here

$$W_{13} = \frac{\partial}{\partial p}\left\{-\frac{\partial u}{\partial s}\cdot[1 - G((p+s')/2)]\right\} \tag{16}$$

$$= \frac{\partial u}{\partial s}\cdot g((p+s')/2) > 0.$$

iv) $W_3(s,s,p)$ has a unique solution, where $W(s,s,p)$ is locally concave around this solution; as noted above this follows from $u_S(\cdot)$ concave and $g(v)/[1-G(v)]$ non-decreasing in v.

v) There exists $k > 0$ such that for all $(s,p) \in [\underline{s},\bar{s}] \times \mathbb{R}$, $W_{33}(s,s,p) \geq 0$ implies $|W_3(s,s,p)| > k$; this implies $W_3(s,s,p)$ is bounded away from zero for p bounded away from $\pi^c(s)$. We can guarantee this condition is met in the current context by without loss of generality restricting the set of proposals to the interval $[\underline{s}, \pi^c(\bar{s})]$.

Now $W_2 < 0$ implies the "worst" belief from the setter's perspective is where the voter is certain $s = \bar{s}$. Therefore in any separating sequential equilibrium it must be that $\pi^*(\bar{s}) = \pi^c(\bar{s})$, since otherwise $\bar{s}$ is separating at some other proposal, but by switching to $\pi^c(\bar{s})$ the setter would receive a strictly higher payoff for any belief at $\pi^c(\bar{s})$. Further, the following single–crossing property holds:

$$\frac{\partial}{\partial s}\left\{\frac{W_3(s,s',p)}{W_2(s,s',p)}\right\} =$$

$$\frac{2\cdot(\partial u/\partial s)\cdot(\partial u/\partial p)\cdot[1 - G((p+s')/2)]\cdot g((p+s')/2)}{[(u_S(p)-u_S(s))\cdot g((p+s')/2)]^2} < 0. \qquad (17)$$

Then Mailath (1987) shows (Theorem 3) that the solution to the differential equation (14) along with the initial value condition $\pi^*(\bar{s}) = \pi^c(\bar{s})$ generate a unique separating equilibrium in the above game given the single–crossing condition holds. The result that $\forall\, s \in [\underline{s},\bar{s})$ $\pi^*(s) < \pi^c(s)$ follows from condition iv) and $W_2 < 0$, $W_{13} > 0$. QED

Therefore by "smoothing" out the voter's expected response we have replaced the pooling result in Banks (1989) with a separating result. When G is degenerate the only way to generate this smoothing is by the voter randomizing, thus requiring the equilibrium proposal strategy to make V indifferent between accepting and rejecting the proposal. While such smoothing is possible in numerous signaling games (eg. Reinganum and Wilde (1986)), it is not possible when G is degenerate, as shown in Banks (1989). The reason is that for types less than the voter's ideal policy indifference requires π to be strictly decreasing, as in the original Romer–Rosenthal (1978),(1979) model, whereas Lemma 1 shows that in any equilibrium π must be increasing regardless of any assumptions on G. On the other hand the current model shows that simply assuming the voter's ideal policy is uncertain is itself sufficient to generate the necessary smoothing.

Further, the incentive constraints on the setter's behavior put a downward pressure on the equilibrium proposals, since in general a setter of type s has an incentive to be thought of as a lower type $s' < s$ if possible. To see this note that if the setter's strategy were such that $\pi^*(s) > \pi^c(s)$ and some other type $s' < s$ proposed $\pi^c(s)$, then s would be strictly better off by proposing $\pi^c(s)$ since lower types receive a higher probability of acceptance then higher types for the same proposal. Therefore the effect of the informational asymmetry concerning the status quo outcome is manifested in a lower proposal by the setter for all true values of the status quo, and consequently a higher probability of acceptance.

Although we have shown the existence of a separating equilibrium, there are of course many other equilibria in the model, a common occurrence in signaling games. Suppose we apply universal divinity, due to Banks and Sobel (1987), as our equilibrium selection criterion. Given a sequential equilibrium pair of strategies $(\pi,\hat{r})$, let $U(s;\pi,\hat{r}) = \tilde{U}_S(s,\pi(s),\hat{r}(\pi(s)))$ be the equilibrium expected utility for the setter of type s, and let p be an out–of–equilibrium proposal. For all $s < p$, define $\theta(s,p;\pi,\hat{r})$ as

$$\theta(s,p;\pi,\hat{r}) = \frac{U(s;\pi,\hat{r})}{u_S(p) - u_S(s)} ; \tag{18}$$

thus if $\theta(s,p;\pi,\hat{r}) \in [0,1]$ then $\theta(\cdot)$ gives the probability of acceptance making a type s setter indifferent between remaining along the equilibrium path (and receiving the payoff $U(s;\pi,\hat{r})$) and deviating to the proposal p. If $p < s$ then we set $\theta(s,p;\pi,\hat{r}) = \infty$. If $\theta(s,p;\pi,\hat{r}) < \theta(s',p;\pi,\hat{r})$ then we say that a setter of type s is "more likely" to deviate to the proposal p than s′, since whenever a voter response would lead s′ to deviate s would as well, but not vice versa. Universal divinity then requires out–of–equilibrium beliefs to place positive probability only on those types that are "most likely" to deviate.

Definition. A triple $(\pi,\hat{r},\mu)$ is a universally divine equilibrium if it is a sequential equilibrium and if $\forall$ p such that $\pi^{-1}(p) = \phi$, $\mu(s',p) > 0$ only if $s' \in \underset{s}{\operatorname{argmin}}\ \theta(s,p;\pi,\hat{r})$.

In what follows we make use of the following result.

Lemma 2. $\forall\ (\pi,\hat{r}) \in \Sigma$, $U(s;\pi,\hat{r})$ is monotone decreasing and continuous in s; thus $\partial U/\partial s$ exists almost everywhere. Further, where $\partial U/\partial s$ exists it satisfies

$$\frac{\partial U}{\partial s} = -\ \lambda(s;\pi,\hat{r})\cdot\frac{\partial u_S}{\partial s} . \tag{19}$$

Proof. Suppose $s < s'$ but $U(s;\pi,\hat{r}) \leq U(s';\pi,\hat{r})$; then $\pi(s) \neq \pi(s')$. But since $u_S(\cdot)$ is strictly increasing and enters negatively into $U(\cdot)$, s can achieve a payoff of at least $U(s')$ by proposing $\pi(s')$, thereby contradicting the assumption of an equilibrium. Continuity follows from the continuity of $u_S(\cdot)$.

Since U(·) is monotone, it is differentiable almost everywhere (Royden (1968)), so $\partial U/\partial s$ exists for almost all s. Since $(\pi,\hat{r}) \in \Sigma$, local incentive compatibility condition is satisfied:

$$\frac{\partial}{\partial s'} \{\lambda(s')\cdot[u_S(\pi(s')) - u_S(s)]\} \Big|_{s'=s} =$$

$$\frac{\partial \lambda}{\partial s} [u_S(\pi(s)) - u_S(s)] + \lambda(s) \frac{\partial u}{\partial p} \frac{\partial \pi}{\partial s} = 0, \tag{20}$$

where this holds for almost all s. Thus where $\partial U/\partial s$ is defined,

$$\frac{\partial U}{\partial s} = \frac{\partial \lambda}{\partial s} \cdot [u_S(\pi(s)) - u_S(s)] + \lambda(s)\cdot[\frac{\partial u}{\partial p} \frac{\partial \pi}{\partial s} - \frac{\partial u}{\partial s}]$$

$$= - \lambda(s)\cdot \frac{\partial u}{\partial s} . \tag{21}$$

QED

Therefore incentive compatibility implies an "envelope theorem"–type of result; this follows since each type of setter is essentially optimizing over which type to behave as given the "suggested" behavior from $(\pi,\hat{r})$. In equilibrium then it must be that each type prefers to behave "truthfully", implying the indirect effect of increasing s on equilibrium utility through changes in the equilibrium proposal $\pi(s)$ and the equilibrium probability of acceptance $\lambda(s)$ is zero. [Banks (1990) shows how this envelope theorem holds in a wide class of asymmetric information games.]

Theorem 2. The unique separating equilibrium defined in Theorem 1 is also the unique universally divine equilibrium.

Proof. Let $(\pi,\hat{r}) \in \Sigma$ and let p be an out of equilibrium proposal; from above we want to characterize $\underset{s}{\operatorname{argmin}}\ \theta(s,p;\pi,\hat{r})$. By Lemma 2 $\theta(\cdot)$ is differentiable almost everywhere and continuous everywhere; thus solving for $\partial\theta/\partial s$ will give the types most likely to defect. From Lemma 2, then,

$$\frac{\partial \theta}{\partial s} = \frac{\partial U/\partial s \cdot [u_S(p)-u_S(s)] - [\partial u_S/\partial p - \partial u_S/\partial s]\cdot U(s)}{[u_S(p) - u_S(s)]^2}$$

$$= \frac{\lambda(s)\cdot \partial u_S/\partial s \cdot [u_S(p)-u_S(s)] - [\partial u_S/\partial p - \partial u_S/\partial s]\lambda(s)[u_S(\pi(s))-u_S(s)]}{[u_S(p) - u_S(s)]^2}$$

$$= \frac{\lambda(s)\cdot \partial u_S/\partial p \cdot [u_S(\pi(s)) - u_S(p)]}{[u_S(p) - u_S(s)]^2} . \tag{22}$$

Since $\lambda(s) > 0$ and $\partial u_S/\partial p > 0$, $\partial\theta/\partial s \gtrless 0$ as $\pi(s) \gtrless p$. Now since $\pi(\cdot)$ is monotone increasing (by Lemma 1) it is differentiable almost everywhere, and "locally" is either pooling, $\partial\pi/\partial s = 0$, or separating, $\partial\pi/\partial s > 0$. Suppose $(\pi,\hat{r}) \in \Sigma$ is such that π has a pooling region (s',s''), ie. $\forall\ s,\hat{s} \in (s',s'')$, $\pi(s) = \pi(\hat{s}) \equiv p^*$. Then π must have a jump discontinuity at s', or $s' = \underline{s}$; otherwise s' would be the supremum of a locally separating region, and the continuity of G would imply a jump discontinuity in the probability of acceptance at s' without a jump in π, thereby violating $U(\cdot;\pi,\hat{r})$ continuous. Let $p = p^* - \epsilon$ for $\epsilon > 0$ and small; then from the above calculation we see that $s' = \underset{s}{\text{argmin}}\ \theta(s,p)$, implying a jump discontinuity in $\hat{r}$ at p^*. But since the voter's optimal response is strictly decreasing in certainty equivalence beliefs, this is a jump downward, or equivalently a jump up in the probability of acceptance. Thus s' can achieve a strictly higher payoff from proposing p for ϵ sufficiently small, thereby contradicting the assumption of an equilibrium.

Therefore in any universally divine equilibrium there are no pooling regions; implying the only such equilibria are separating. By Theorem 1 then the unique universally divine equilibrium is the unique separating equilibrium. QED

Hence in the current model there exists a unique universally divine equilibrium, where this equilibrium is separating, whereas in Banks (1989) there exists a continuum of universally divine equilibria, all of which involve pooling. Banks (1989) shows that for some prior distributions F over the setter's type, if we select the equilibrium with the highest accepted proposal, there exists a negative relationship between this equilibrium proposal and the ex ante expected status quo, demonstrating an analogous result to the Romer–Rosenthal (1978),(1979) result on the effect of the actual status quo on the equilibrium outcome. However in the current model the only universally divine equilibrium is separating, and therefore is invariant to changes in the prior F as long as the support remains the same. Therefore changes in the ex ante expected status quo while keeping the support unchanged have no effect on the behavior of the setter or the voter.

4. Conclusion

In Banks (1989) the model of monopoly agenda control due to Romer and Rosenthal (1978),(1979) was extended to an environment where only the agenda setter knew the value of the status quo outcome. In that paper it was shown how the setter is unable to separate in her proposal strategy and thereby reveal all of the private information to the voters. The current paper has explored the sensitivity of this pooling result to the assumption of complete information concerning the voter's preferences. We have shown how relaxing this assumption leads to the existence of a unique separating equilibrium, where this is the only equilibrium to satisfy the criterion of universal divinity. Further in this equilibrium a simple and informative comparison in generated with the model where the status quo is known by the voters, namely, the equilibrium proposals in the former are strictly less than in the latter for almost all values of the status quo, implying a strictly greater probability of acceptance as well. Therefore the degree to which the agenda setter can bias the policy outcome in her favor is mitigated by the presence of an informational asymmetry concerning the status quo.

Two extensions of the current model are immediate. The first involves allowing the voter to signal his preference information, possibly through some pre–election "poll". The second would examine a repeated elections model in which the outcome of the current election influences the status quo in the next election, and where voter preferences are perhaps imperfectly correlated over time. Both of these options will hopefully be explored in future research.

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