Choosing Among Signalling Equilibria in Lobbying Games

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Eric Rasmusen

Abstract

Randolph Sloof has written a comment on the lobbying-as-signalling model in Rasmusen (1993) in which he points out an equilibrium I missed and criticizes my emphasis on a particular separating equilibrium. In this response, I discuss how to interpret multiple equilibria in games and how to interpret mixed strategy equilibria in which two types of player with identical incentives must pick different mixing probabilities.

Indiana University School of Business, Rm. 456,

1309 E 10th Street, Bloomington, Indiana, 47405-1701. Secretary, 812-855-9219, direct 812-855-3356 Fax: 812-855-3354. Email: Erasmuse@indiana.edu. Web: http://ezinfo.ucs.indiana.edu/∼erasmuse.

Dr. Sloof's comments on Rasmusen (1993) raise a number of methodological issues that may be of interest to more readers of *Public Choice* than just those who study lobbying. I will try, therefore, to respond to them in a way intelligible to those who have not read the original article, using the model as an example of more general issues. I will discuss: 1. How to react to multiple equilibria, 2. Mixed strategies when different types of player must choose different mixing probabilities, and 3. Important and unimportant differences between equilibria.

First, let me recapitulate Rasmusen (1993). A lobbyist wants a politician to choose a new policy. The lobbyist knows whether the voters will later reward the politician for the innovation, but the politician does not. If the voters actually want the new policy, we will call the lobbyist a "truthful lobbyist"; otherwise, we will call him a "lying lobbyist." The lobbyist incurs a direct cost for lobbying, but not for lying. The politician can, at some cost, try to verify the lobbyist's assertions, and if the lobbyist is silent the politician can pay for an independent investigation.

The most interesting equilibrium, I asserted, is the mixed strategy separating equilibrium E3, in which lying lobbyists sometimes lobby and truthful lobbyists always lobby, while politicians sometimes verify but never investigage independently. Dr. Sloof disputes my emphasis on E3 and points out a new equilibrium, E5, that I missed.

The General Problem of Multiple Equilibria. Games often have multiple Nash equilibria, and applying uncontroversial ideas like sequential rationality often still leave multiple equilibria. Signalling games, in particular, usually have at least two equilibria: a pooling one, where signalling has no impact, and a separating one, where it does. So what should the modeller's next step be?

Approach 1 is to think of ways to rule out all but one equilibrium. The modeller could apply refinement concepts such as divinity (Banks & Sobel [1987]) or the intuitive criterion (Cho & Kreps [1987]), but nobody has come up with a persuasive general refinement, and rather than just citing previous work, the modeller really has to argue for the refinement in his particular case. Sloof shows how to use Approach 1 in his Lemma, and shows how even if it were justified it would fail in this particular model. In the text, he uses what I will call Approach 2, which is to discuss how a variety of principles such as insufficient reason and pareto optimality apply to the particular model. I take that approach to some extent in Rasmusen (1993), but my analysis is really based on yet a third approach.

Approach 3 to the problem of multiple equilibria is not to mind them. Remember that the point of a model is to explain something in the real world. In the real world, it seems that uninformative lobbying and political demonstrations take place. How are we to explain it? Must it be irrational, or just fun for the lobbyist and demonstrator, or does even contentless political activity have some persuasive power?

The explanation in Rasmusen (1993) is that lobbying is part of a separating equilib-

rium of a signalling model. When certain conditions on information and costs are satisfied, and people expect lobbying to work as a signal, it will work as a signal. This leaves unexplained why it is that people expect lobbying to work, when another equilibrium is possible in which people do not expect lobbying to work, but I do not find that very objectionable. The signalling equilibrium also assumes that lobbying costs are not prohibitively high, without explaining why that is so, and we make such assumptions all the time. We can still argue about the plausibility of assumptions— Approach 2, again— but it should not be distressing if we find a number of contradictory assumptions all realistic for different real world settings.

It may well be that sometimes the real-world expectations are that lobbying will not work as a signal. That is fine: we do not need or want a model which says that in every country in every era uninformative lobbying will take place. Suppose two equilibria are possible, depending on expectations, and we observe uninformative lobbying taking place in country X. We can explain X as the result of rational signalling, and the fact that the pooling equilibrium is being played out in countries Y and Z is no objection to our explanation for X.

I view the main criterion for a model as its explanatory power rather than its falsifiability or its ability to predict, but note that a model with multiple equilibria has no problem with these other criteria either. Suppose that in the model fact A implies equilibria B or C. The model is falsified if A and D are observed, and it narrows the predictions down to B and C rather than B,C, D, E, F. If I have a model which explains earthquakes in such a way as to imply that there will be an earthquake on either March 1 or March 5 if it snows in January, then not only is this model falsifiable, it is highly useful if correct, despite its ambiguous predictions.

In the lobbying model, Sloof comments that if the original regime prohibits lobbying, and then the prohibition is lifted, the resulting equilibrium might be one in which lobbying never occur, rather than the lobbying equilibrium E3. If this is true, then predictions cannot be made without qualification. To take the simplest example, I cannot say "The amount of lobbying will rise when lobbying is made legal," but must say, "The amount of lobbying will rise or stay the same when lobbying is made legal." I think the stronger prediction is nonetheless valid. If legalization results in the no-lobbying equilibrium with 99 percent probability and the lobbying equilibrium with 1 percent probability, the expected amount of lobbying unambiguously rises. If a nation is trying to decide whether to legalize lobbying, and welfare will be higher if the lobbying equilibrium is played out and unchanged if it is not, the policy implication is unambiguous. Uncertain predictions can still be valuable predictions.

Players with the Same Incentives Choosing Different Mixing Probabilities. Although the preceding section suggests that multiple equilibria need not be distressing, let us now return to Approach 2 I will try to expand on why I think equilibrium E2 is implausible.

In E2, the story is something like this. Verification and investigation are costly enough that the politician never does them. If he does not see lobbying, he never adopts the new policy. If he does, then he sometimes adopts the new policy, because the lying lobbyist only lobbies with probability .2, but the truthful lobbyist lobbies with probability .9. The lobbyist types are willing to pick .2 and .9 not because the lying lobbyist is more afraid of getting caught (the politician never tries to verify, remember), but because each type is indifferent between *any* probability between 0 and 1 in a mixed strategy equilibrium.

It is always true in a mixed strategy equilibrium that the mixing player is indifferent about his behavior, but must pick one probability to support the equilibrium. Here, each truthful lobbyist is indifferent between probability 0 and 1, but he picks .9. The usual argument is that unobservable characteristics of the lobbyist or the time of choice determine this. He really pursues a pure strategy of 0 if his mood of optimism fails to reach a certain good level, and 1 otherwise, and that certain mood level is reached on 90 percent of occasions. (See Harsanyi [1973].)

Here, however, it is more difficult to apply that argument. The two lobbyist types have identical incentives, but must pick different mixing probabilities in the same equilibrium. Since politicians never verify or investigate, true and false lobbyists are faced with identical incentives, and their problem is one of pure signalling. We cannot explain this using unobservable type characteristics, so that actually in the population each lobbyist pursues a pure strategy, because here those unobservables have to split lobbyists at exactly .9 and exactly .2. The lying lobbyists require a different critical mood level than the truthful lobbyists. Why, when their payoff functions are identical? One could argue that the critical levels are for costliness of lobbying for the truthful lobbyists and degree of moral qualms for the lying lobbyists, but whether something like this would work is unclear enough to require formal modelling. (The best place for such modelling would, of course, have been in the original paper, but I encourage anyone interested in this topic, either as applied to lobbying or more generally, to follow it up.)

Let us now turn to equilibrium E5, which, as Sloof correctly notes, I simply failed to detect. This is an important omission in my paper, because Equilibrium E5 has intuitive plausibility, though it shares something of the delicacy of E2.

In equilibrium E3, the lying lobbyist lobbies sometimes but the truthful lobbyist lobbies always. The politician sometimes tries to verify lobbying, but never investigates independently if no lobbying occurs, since he knows that if change is desirable, he will see lobbying.

In equilibrium E5, both types of lobbyists lobby sometimes, but the truthful lobbyist uses a higher probability. The politician sometimes tries to verify lobbying, and sometimes investigates independently if no lobbying occurs. This equilibrium only exists, naturally, if investigation is cheap enough for the politician.

The difference is that in E5 the truthful lobbyist does not always lobby, and the politician sometimes investigates independently. As a result, it can happen in E5, but not E3, that innovation is desirable, the lobbyist fails to lobby, and the new policy is not adopted.

The appealing intuition behind E5 is the idea that when investigation is cheap enough, the lobbyist will try to save on lobbying costs in the hope that the politician will investigate for himself.

As in equilibrium E2, however, player types with identical incentives chose different mixing probabilities. The expected benefit of lobbying is the same for the truthful lobbyist as for the lying one, but it is not so obvious, because the components of the expected benefit are different. Suppose a lobbyist is considering switching from not lobbying to lobbying. A cost for either type is that he must pay the direct lobbying cost. The benefit for the lying lobbyist is that maybe the politician will not verify, and will adopt the new policy. The benefit for the truthful lobbyist is bigger in that the politician will certainly adopt the new policy, whether he verifies or not, but from this benefit must be subtracted the loss of the probability that the politician would have investigated and changed his policy even if there were no lobbying. Since the politician has identical probabilities of investigation and verification in E5, the net benefit for the truthful lobbyist turns out to be exactly the same as the net benefit for the lying lobbyist.

E5 does have more leverage than E2 as to why the truthful lobbyist would behave differently from the lying lobbyist. In E2, the only difference was that one type might have more moral qualms to deal with. In E5, individual differences between politicians in either verification or investigation costs might differentiate mixing situations. In addition, with both politician and lobbyist mixing, correlations between unobservables politician and lobbyist might differentiate truthful from lying lobbyists. Given this greater complexity, I find E5 more plausible than E2.

Importand and Unimportant Differences in Equilibria. Let us suppose E5 is as likely as E3. Is that a problem? —Yes, but not in the most obvious way.

In both E3 and E5, the lying lobbyist lobbies some but not all of the time, and the truthful lobbyist lobbies more often, and the politician checks up on the lobbyist some but not all of the time. The difference is that the honest lobbyist sometimes will not bother to lobby, because he knows that the politician will sometimes investigate for himself even if no lobbying occurs. As a result, sometimes desirable new policies will not be adopted.

In terms of the most interesting implications— that lobbyists will sometimes engage in non-informative lobbying and that politicians will sometimes refrain from investigating issues because they rely on lobbyists— E3 and E5 are the same. The purpose of the lobbying model is to explain those behaviors, and the presence of E5 does not affect that.

The model's prediction that a desirable new policy will always be adopted flows out of the modelling, but is, alas, not one of the real-world facts that needs explaining, and was not

one of the features of the model that I emphasized. Any model requires assumptions, both positive ones and the negative *ceteris paribus* assumption, and we do not take our models' definitive predictions as gospel. Even without equilibrium E5, the lobbying model is not disproved if someone finds many new policies which the electorate wants but for which no one lobbies or investigates. Sometimes no lobbyist is interested and the politician is too busy or miscalculates. Thus, the qualitative differences in behavior between E3 and E5 are not serious differences.

What is more important is the difference in welfare results that arise from the inner workings of the two equilibria. Dr. Sloof points out that in E3, welfare rises when the politician's investigation cost and the politician's certainty about the electorate's views rise, but in E5 these changes have ambiguous effects, because they discourage the lobbying of the truthful lobbyist. This is a genuine difference, and were I to rewrite the paper I would want to either rule out E5 on the lines discussed above, or, more likely, weaken Proposition 2. Here, I would just like to make the point that sometimes apparently different multiple equilibria have the same properties as far as a model's purpose goes, and one must look carefully to see whether they have differences in the features the model is trying to address.

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