Citius-Altius-Fortius ?
Climb faster! Climb higher! Be stronger!
Or not at all?
Incentives and tradeoffs for politicians in the policy setting process

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Abstract

Modeling the policy setting process has evolved considerably. First attempts assumed benevolent dictators that would choose optimal policies. However, closer inspection showed the selected policies were less than optimal. The models employed were missing key players, such as interest groups, and therefore were unable to adequately portray the policy setting/bargaining process. In this paper we describe the policy setting/bargaining process with a two stage Stackelberg Leader-follower model general enough to allow for aggregate welfare maximization as well as office seeking or partisan politicians. The model establishes a theoretical way to measure the influence of special interest groups' efforts to influence the policy setting process. The deadweight losses appear as the distance between the aggregate welfare maximizing policy vector and the equilibrium policy vector.

Economists must not only know their economic models, but also understand politics, interests, conflicts, passions – the essence of collective life. For a brief period of time you could make changes by decree; but to let them persist, you have to build coalitions and bring people around. You have to be a politician.

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1 Introduction

When politicians or bureaucrats[1] develop their own personal agenda to escalate the ranks of government the policy outcomes are usually second best, the production process of the economy becomes inefficient, the wrong signals are sent into the market, and incentives are distorted. The occurrence of such situations lowers society's welfare and creates rent-seeking opportunities for special interest groups. Having realized the existence of such dynamics in the governmental structure, the purpose of this paper is to model the policy selection/bargaining process and incentives politicians, who are not correctly matched with their functions have to climb the political power ladder. The objective is twofold: first, build and present a model that is able to adequately describe politicians who are correctly matched with their functions and those who are not; and second, is useful in evaluating the policy outcomes given this desire of some to escalate.

Whenever there is a possibility to obtain and profit from rents and economic agents realize the existence of this opportunity they will invest resources in trying to secure these rents for personal gain. This shift in resources can distort incentives in the economy and cause a movement to an inefficient production point in the production possibilities frontier. These inferior outcomes appear as the result of a bargaining process between government officials and special interest groups. Tullock (1967) compares these outcomes to the government requiring an established industry to abandon an efficient method of production and adopt an inefficient one. Nonetheless the extremely illogical tone of the preceding sentence, suboptimal policies are employed constantly. These outcomes are so prevalent that they have generated a body of literature analyzing the process by which they come about and the deadweight costs they entail.[2] As Mitra (1999) states, "This idea that government policy is determined through the interactions between organized interest groups and politicians is not new."

The starting point of this literature is Stigler's (1971) Theory of Economic Regulation where pressure groups make calculations on how much resources to invest in lobbying the government. Subsequently, Krueger (1974) presents a model where competitive rent-seeking adds a welfare cost to the one already incurred by having the government impose quantitative restrictions on import markets. She states the extra welfare cost is substantial and should not be underestimated. Similarly Tullock (1967) realizes the total costs should be measured in terms of the efforts by the unsuccessful as well as the successful. Additionally, Peltzman (1976) and Becker (1983) are concerned of the size of the deadweight loss imposed on society, the size of the gains to special interest groups, and what limitations can the government apply to reduce these gains to a select few. These pioneering articles have generated a considerable number of rent-seeking models

[1] For the rest of the paper, the term politicians will also include bureaucrats.

[2] Refer to Tullock (1967), Krueger (1974), Stigler (1971), Peltzman (1976), Becker (1983, 1985), Ball (1995), Grossman and Helpman (1994, 1995, 2001, 2002), Persson and Tabellini (2000), and Rodrik (1995).

with most applications being in the area of trade policy setting.[3]

In this paper, we model both sides of the political rent-seeking process in the spirit of the Grossman and Helpman (1994) framework where the government maximizes an objective function that includes aggregate welfare and interest group contributions as arguments. However, unlike the authors just mentioned we do not assume the rent seeking efforts are only monetary contributions, *i.e.* pure transfers, and therefore entail no deadweight losses to society. In fact, the existence of a deadweight loss is fundamental in the policy evaluation. These deadweight losses appear as the distance between the observed equilibrium policy vector and the policy vector that would maximize society's welfare.

In order to model the special interest groups' motivations we take advantage of Stigler's (1971) hypothesis about the fact that every industry or occupation that has enough political power to utilize the State will seek to exert its influence. By using this hypothesis, we rule out approaches such as Ball's (1995) where lobbying by special interest groups could possibly be beneficial. This welfare enhancing effect is achieved in a setting with asymmetric information and lobbying serves as a signaling device to induce the government into choosing "better" policies. While this point of view is highly innovative it is also doubtful that any particular interest group could have the same goal as society. In modeling the type of politicians, unlike Persson and Tabellini (2000), we allow for politicians to be simultaneously opportunistic (*office seekers*) or partisan. Not constraining politicians to be of a certain type in the model implies they are able to endogenously assign weights to the arguments in their utility function and their actions are not dictated automatically by the efforts and actions of special interest groups.[4] This flexibility of the model translates into an adequate/inadequate matching of politicians with their functions.

The structure of the paper is as follows. Section 2 introduces the dynamics of the interaction between special interest groups and politicians with a heuristic example to build intuition about the possible outcomes of the model. It must be said that this model is general and flexible enough to apply to democracies, dictatorships, or any type of regime that has a bureaucracy. The reader will notice that there is no voting model or rule included in the paper. While this extra dimension would provide this model with an almost lifelike quality it would highly complicate the analysis at this stage. The term "special interest groups" can be applied to any type of organization, individual, country, or entity that can apply pressure on the government *e.g.* it can be other politicians capable of helping the current politician escalate (past presidents or primer ministers exerting influence on the current one). Once the basic idea has been stated, we describe the transformation from a simple example into formal game theo-

[3]See Grossman and Helpman (1994, 1995, 1996, 1997), Goldberg and Maggi (1999), and Mitra (1999, 2002) for theoretical and empirical applications of rent-seeking models to trade policy.

[4]It is our opinion that increased flexibility in modeling the motivations held by politicians resembles them more closely. A very recent example of this is Sonia Gandhi's passing up becoming India's Prime Minister. Therefore, assuming all politicians are purely office seekers is clearly an incorrect assumption. For more information on Sonia Gandhi refer to the New York Times, May 19, 2004 Editorial/Op-Ed Section.

retic terms. Finally, the last part of section 2 presents the mathematics of the policy setting process as a two stage Stackelberg Leader-follower maximization problem. Section 3 establishes the comparative static results of the major outcomes from the model in this paper. Finally, section 4 provides a brief summary, conclusions, and establishes the road ahead in order to take this model to an empirical application with testable hypotheses.

2 Model

This section presents the model employed in the development of the theory in this paper. Before jumping directly into the mathematics lets build intuition about the story occurring in this simple world.

2.1 The Heuristics

Imagine a world where interest groups and politicians coexist and interact with each other. The story here describes the nature of the interaction and how equilibrium and balance are achieved between the interest groups' and politicians' objectives. In order to make this presentation tractable assume that interest groups have coherent and rational preferences and seek to maximize their utility. On the other hand, politicians have individual utility functions, their goal is to maximize personal utility, and there is excess demand for certain type of jobs (*e.g.* more than one individual wants to be Finance Minister or President).

We will define that a politician is perfectly matched with his functions if he does not develop a personal agenda for career advancement and perfectly mismatched if he does develop a personal agenda for career advancement. In the creation of this world the very first assignment of jobs was done randomly and therefore politicians can be perfectly matched or perfectly mismatched with their job and the functions it entails. The idea of competition among politicians for certain type of jobs will set the stage for the outcome.

Assume the interest group or groups have a utility function

$$U^j = U^j(\mathbf{x}_0, effort(effectiveness_j, costs_j)) \tag{1}$$

where $j = 1, ...M$; $\mathbf{x}_0$ is a vector composed by the policy choices made by the politicians, and $effort(effectiveness_j, costs_j)$ represents how much effort the interest group made in order to influence the politician making the policy decisions. The $effort$ variable depends on how effective the interest group is at lobbying and what are the costs of this activity. An interpretation of $effectiveness$ would be if the interest group hires the best political marketing firm with the most creative individual working on this campaign and the interpretation of the $costs$ variable would be what is the cost of the supplies needed for a public relations campaign, what are the fees of the public relations firm, etc.

The utility function for the politicians is the following:

$$u_i = u_i \left(\begin{array}{c} \alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0), \\ I\{if\ \mathbf{x}_0 \neq \bar{\mathbf{x}}_0\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0, U^j(\mathbf{x}_0, effort)) \end{array} \right) \quad (2)$$

where $Aggregate\ Welfare(\mathbf{x}_0)$ is a strictly quasiconcave function representing the collective well-being of the society or country in question and is a function of $\mathbf{x}_0$; the term $escalating(\mathbf{x}_0, U^j(\mathbf{x}_0, effort))$ represents the desire of the politician to climb the political ladder, *i.e.* getting a job that has more "power" than the previous one. A simple example of this would be one of the ministers in a cabinet climbing to become Prime Minister or President of some country. This *escalating* variable is a function of $\mathbf{x}_0$ and the utility function of the interest group; α_{1i} and α_{2i} represent the weights assigned by the politician to each argument in his utility function; finally $I\{if\ \mathbf{x}_0 \neq \bar{\mathbf{x}}_0\}$ is the indicator function and it takes the value of 1 when the politician chooses a policy vector that is different from $\bar{\mathbf{x}}_0$, the policy choice that maximizes aggregate welfare, and *zero* otherwise. The indicator function is included to avoid the awkwardness of having an undefined ratio of $\frac{\alpha_{1i}}{\alpha_{2i}}$ when the politician puts no weight on the demands of the interest groups.

How would we visualize the interaction between these players? The Figure 1 presents the basic framework that we will be operating with. For now lets constrain the number of interest groups and politicians both to one.

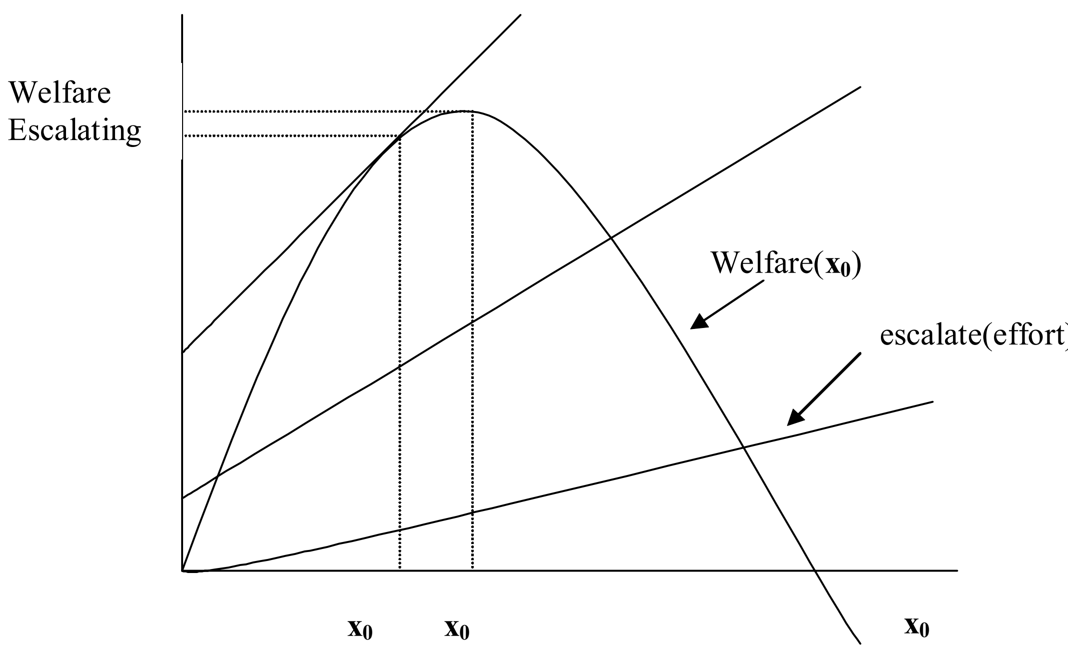

Figure 1: Tradeoff!

The figure above presents Aggregate Welfare and Escalating as a function of the vector of policy choices, $\mathbf{x}_0$. The Aggregate Welfare function is a strictly quasiconcave function and therefore has a unique maximum at $\bar{\mathbf{x}}_0$. The other curve is the politician's escalating function. This function determines how the politician climbs the political pyramid and it's slope determines the velocity of this ascension. Notice that the utility of the interest groups and, by transitivity, the effort these groups put into lobbying will shift and modify the slope of the politician's escalating curve. This will become critical in achieving the equilibrium of the system. What is the solution in this framework? In Figure 1, the solution will be that point where the slope of the Aggregate Welfare function and the politician's escalating function have the same slope. This implies the equality of the marginal utility of aggregate welfare and marginal utility of escalating for the politician.

What happens if the politician is non-responsive to interest group demands? In that case, the escalating function is not represented in the picture. The politician will then maximize his utility, which in turn will maximize Aggregate Welfare because the politician's individual utility function matches exactly the Aggregate Welfare function. The solution will then be the $\bar{\mathbf{x}}_0$ policy vector. we define this case as the benchmark, where the politician has not developed a personal agenda for career advancement. This state will be employed in comparisons with other situations. On the other hand, when the politician has developed a personal career advancement agenda (*i.e.* he/she is not adequately matched with his/her functions) Aggregate Welfare is not maximized and therefore the equilibrium outcome is located at a point $\hat{\mathbf{x}}_0$ to the left of $\bar{\mathbf{x}}_0$. The distance between $\hat{\mathbf{x}}_0$ and $\bar{\mathbf{x}}_0$ will depend on the slope of the escalating function, which will be determined by the amount of effort put by interest groups to try and lobby politicians. An outcome of this is that only those politicians who are not perfectly matched can be lobbied into choosing policy vectors that are different from the one that maximizes aggregate welfare.

2.2 In Game Theory terms ...

The heuristic story from the preceding section sketches a basic framework which can be used as a springboard to explain more complicated bargaining situations. However, before doing that lets formalize the story into a model. The following figure describes the sequential game interest groups and politicians play.

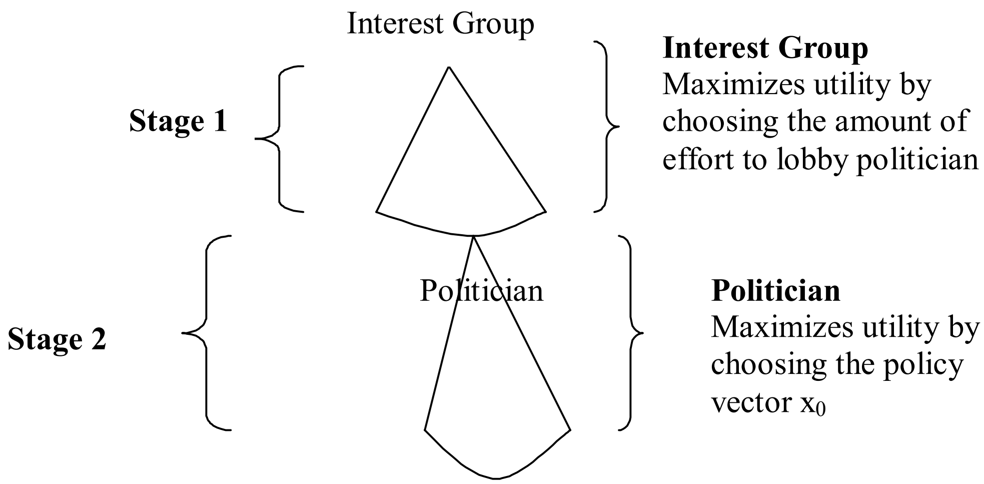

Figure 2: Sequential Game

Broadly describing Figure 2, in Stage 1 the interest groups will maximize their utility function choosing the amount of effort necessary to lobby the politician in order for him/her to choose a policy vector that is favorable to the interest group. Since the effort variable is treated as continuous there is an infinite number of strategies that the interest group can take. In Stage 2, the politician maximizes utility by choosing a policy vector. The politician also has an infinite number of strategies because the policy vector is treated as a continuous variable. The reader might be wondering how were the job assignments allocated to politicians. In Stage 0, not included in the figure, Nature randomly assigns the available jobs to politicians. The total number of politicians is much larger than the available jobs creating excess demand for jobs. This promotes competition for jobs and creates the incentives for politicians to "listen" to interest groups.

How is the model solved? The Nash equilibrium of the game is found by applying backward induction, which implies solving the second stage of the game first, the politician maximizes personal utility by choosing the policy vector $\mathbf{x}_0$. Once the politician has done his/her optimization exercise, the interest group maximizes utility by choosing some level of effort. The interest group's optimization exercise is performed taking into account the policy vector ($\mathbf{x}_0$) chosen by the politician. Therefore, if the politician cannot be influenced by the interest group, *i.e.* is perfectly matched because the personal utility function corresponds identically to the Aggregate Welfare function, the interest groups will not put any effort into lobbying the politician.

2.3 The Mathematics!

The model presented here tries to formalize the description presented in Figure 2 and in the above paragraph. The game is similar to the setup of the sequential Stackelberg Leader-follower model in which there are two stages before an equilibrium outcome can be reached.[5] The following assumptions are needed in order to guarantee a unique equilibrium outcome:

1. Utility functions for the politicians, interest groups, and for the aggregate welfare are strictly quasiconcave, continuous, and are at least C^2.

2. The set of available policies X is compact and convex.

3. The set of available effort E is compact and convex.

The setup of the model is the following. Looking for the Sub-Game Perfect Nash Equilibrium and solving the model by backward induction, starting from Stage 2 each politician is self-interested and therefore wants to maximize his utility:

$$
\begin{aligned}
Max\ u_i &= \left\{ u_i \left(\begin{array}{c} \alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0), \\ I\left\{if\ \mathbf{x}_0 \neq \bar{\mathbf{x}}_0\right\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0, U^j(\mathbf{x}_0, effort)) \end{array} \right) \right\} \\
where\ i &= 1......N\ and\ j = 1......M \qquad (3) \\
& \quad s.t. \\
Aggregate\ Welfare &= AgWelfare(\mathbf{x}_0) \geq \bar{W} \qquad (4) \\
U^j(\mathbf{x}_0, effort) &\geq \bar{U}^j \qquad (5)
\end{aligned}
$$

where the utility function is the same as the one previously defined in 2, in this case we allow for N politicians, M interest groups; $\mathbf{x}_0$ is a $k \times 1$ vector. Additionally, the politician's optimization exercise is constrained by two issues to take into account a minimum level of aggregate welfare and a minimum level of utility for each interest group. The next step is to optimize.

Setting up the Lagrangian we have the following:

$$
\pounds_p = \left\{ \begin{array}{c} u_i\left(\alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0), I\left\{if\ \mathbf{x}_0 \neq \bar{\mathbf{x}}_0\right\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0, U^j(\mathbf{x}_0, effort))\right) \\ +\mu(\bar{W} - AgWelfare(\mathbf{x}_0)) + \lambda_j(\bar{U}^j - U^j(\mathbf{x}_0, effort)) \end{array} \right\} \qquad (6)
$$

where μ and λ_j, $j = 1, ...M$ are scalars and represent the Lagrange multipliers.

The first order conditions are the following:

[5] The mathematical model presented is as general as possible. Perhaps for the benchmark case the constraints are redundant. However, they will be useful and will provide interesting results in other cases.

$$\frac{\partial \pounds_p}{\partial \mathbf{x}_0} = \left\{ \begin{array}{c} \alpha_{1i} \frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} + I\{\cdot\}\, \alpha_{2i} \left(\begin{array}{c} \frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} + \\ \frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} \end{array} \right) \\ -\mu \left[\frac{\partial AgWelfare}{\partial \mathbf{x}_0} \right] - \lambda_j \left[\frac{\partial U^j}{\partial \mathbf{x}_0} \right] \leq 0 \end{array} \right\} \quad (7)$$

$$\frac{\partial \pounds_p}{\partial \mu} = (\bar{W} - AgWelfare(\mathbf{x}_0)) \leq 0 \quad (8)$$

$$\frac{\partial \pounds_p}{\partial \lambda_j} = (\bar{U}^j - U^j(\mathbf{x}_0, effort)) \leq 0 \quad (9)$$

where $\frac{\partial \pounds_p}{\partial \mathbf{x}_0}$ is a $k \times 1$ vector. In total we have $k+M+1$ first order conditions. The $M+1$ complementary slackness conditions are the following:

$$(\bar{W} - AgWelfare(\mathbf{x}_0)) \cdot \mu = 0 \quad (10)$$

$$(\bar{U}^j - U^j(\mathbf{x}_0, effort)) \cdot \lambda_j = 0 \quad (11)$$

The solution to the system of equations presented above will be $\mathbf{x}_0^* = \arg\max u_i \left(\bar{W}, AgWelfare, \bar{U}^j, U^j\,(effort)\,, escalating, \alpha_{1i}, \alpha_{2i} \right)$. Now turning to the first stage, the interest groups maximize utility taking into account the policy vector $(\mathbf{x}_0^*)$ chosen by the politician in the second stage. Interest groups do the following optimization exercise:

$$Max\ U^j = U^j(x_0^*, effort(effectiveness_j, costs_j, \mathbf{x}_0^*)) \quad (12)$$

$$s.t.$$

$$effort = effort_j(effectiveness_j, costs_j, \mathbf{x}_0^*) \geq \bar{E}_j \quad (13)$$

where $effort_j$ is a function of how effective the lobby groups are at convincing the politicians to chose policies closer to their liking and the costs of this lobby activity; $\bar{E}_j$ is a minimum level of effort.

Setting up the Lagrangian for the interest groups we have:

$$\pounds_L = U^j(\mathbf{x}_0^*, effort_j(effectiveness_j, costs_j, \mathbf{x}_0^*)) + \theta_j(\bar{E}_j - effort_j(effectiveness_j, costs_j, \mathbf{x}_0^*)) \quad (14)$$

The first order conditions for the interest groups are the following:

$$\frac{\partial \pounds_L}{\partial effort_j} = \frac{\partial U^j}{\partial effort_j} - \theta_j \left[\frac{\partial effort_j}{\partial effectiveness_j} \right] \leq 0 \quad (15)$$

$$\frac{\partial \pounds_L}{\partial \theta_j} = (\bar{E}_j - effort_j(effectiveness_j, costs_j, \mathbf{x}_0^*)) \leq 0 \quad (16)$$

The complementary slackness conditions are the following:

$$(\bar{E}_j - effort_j(effectiveness_j, costs_j, \mathbf{x}_0^*)) \cdot \theta_j = 0 \tag{17}$$

The solution to this utility maximization problem is then a level of effort that makes the following statement valid:

$$\begin{aligned} effort_j^* &= \arg\max U^j \\ &= U^j(\mathbf{x}_0^*\left(\bar{W}, AgWelfare, \bar{U^j}, U^j\left(effort\right), escalating\right), effort(effectiveness_j, costs_j, \mathbf{x}_0^*)) \end{aligned}$$

Therefore, the Nash Equilibrium of this sequential two stage game is an $\left(effort_j^*, \mathbf{x}_0^*\right)$ vector such that the following is valid for the politicians

$$\left\{ \begin{array}{c} u_i \left(\begin{array}{c} \alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0^*), \\ I\left\{\cdot\right\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0^*, U^j(\mathbf{x}_0^*, effort^*)) \end{array} \right) \geq \\ u_i \left(\begin{array}{c} \alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0^{'}), \\ I\left\{\cdot\right\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0^{'}, U^j(\mathbf{x}_0^{'}, effort^*)) \end{array} \right) \\ \forall\ \mathbf{x}_0^{'} \in X \end{array} \right\}$$

and for the interest groups

$$\left\{ \begin{array}{c} U^j(\mathbf{x}_0^*, effort^*(effectiveness_j, costs_j, \mathbf{x}_0^*)) \geq \\ U^j(\mathbf{x}_0^*, effort^{'}(effectiveness_j, costs_j, \mathbf{x}_0^*)) \\ \forall\ effort^{'} \in E \end{array} \right\}$$

Proof. This proof is trivial since the Sub-Game Perfect Nash equilibrium (SPNE) given by $\left(effort_j^*, \mathbf{x}_0^*\right)$ is the outcome of a joint utility maximization process. Assume that $\left(effort_j^*, \mathbf{x}_0^*\right)$ is not a SPNE then there $\exists$ $\tilde{\mathbf{x}}_0$ such that $\left\{ \begin{array}{c} u_i \left(\begin{array}{c} \alpha_{1i} \cdot Aggregate\ Welfare(\tilde{\mathbf{x}}_0), \\ I\left\{\cdot\right\} \cdot escalating(\mathbf{x}_0^*, U^j(\tilde{\mathbf{x}}_0, effort^*)) \end{array} \right) \geq \\ u_i \left(\begin{array}{c} Aggregate\ Welfare(\mathbf{x}_0^*), \\ I\left\{\cdot\right\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0^{'}, U^j(\mathbf{x}_0^*, effort^*)) \end{array} \right) \\ \forall\ \mathbf{x}_0^{'} \in X \end{array} \right\}$, but

$x_0^* = \arg\max u_i\left(\bar{W}, AgWelfare, \bar{U^j}, U^j\left(effort\right), escalating\right)$, therefore it must be the case that $\tilde{\mathbf{x}}_0 = \mathbf{x}_0^*$. A similar argument applies to the interest groups. ■

2.4 The Benchmark Case

The previous subsection established that $\left(effort_j^*, \mathbf{x}_0^*\right)$ is a SPNE and therefore the solution to this utility maximizing problem. The next step is to locate $\mathbf{x}_0^*$ in terms of Figure 1. It was also mentioned earlier in the body of this paper that the benchmark is the undistorted case, where all politicians are perfectly matched with their functions. Additionally, for this case assume there is perfect information so that everyone knows whether the politicians are correctly/incorrectly matched with their functions. Then $\mathbf{x}_0^*$ is that policy vector that maximizes aggregate welfare because the politician has only one concern in the world and that is society's welfare. Therefore, his/her utility function coincides exactly with society's.

Definition 1 *Let* $\|\mathbf{x}_0^* - \hat{\mathbf{x}}_0\|$ *be the norm between the Sub Game Perfect Nash Equilibrium Outcome and the policy vector that maximizes aggregate welfare* $(\hat{\mathbf{x}}_0)$.

Proposition 2 *When the politician(s) has(have) no personal career advancement agenda then* $\|\mathbf{x}_0^* - \hat{\mathbf{x}}_0\| = 0$.

Proof. In this case, the utility function of the politician becomes

$$u_i\left(\alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0^*)\right)$$

because there is no concern for career advancement; maximizing personal utility is equivalent to maximizing aggregate welfare in which case $\mathbf{x}_0^* = \arg\max u_i = \arg\max Aggregate\ Welfare$ and that implies $\mathbf{x}_0^* = \hat{\mathbf{x}}_0$ which then yields $\|\mathbf{x}_0^* - \hat{\mathbf{x}}_0\| = 0$. ■

Proposition 3 *When the politicians are semi-perfectly matched some will have developed a personal career advancement agenda and some will not then* $\|\mathbf{x}_0^* - \hat{\mathbf{x}}_0\| > 0$.

Proof. Assume not, therefore $\|\mathbf{x}_0^* - \hat{\mathbf{x}}_0\| = 0$ but some politicians put positive weight on career advancement and therefore have a utility function of the form

$$u_i\begin{pmatrix} \alpha_{1i} \cdot Aggregate\ Welfare(\mathbf{x}_0), \\ I\{\cdot\} \cdot \alpha_{2i} \cdot escalating(\mathbf{x}_0, U^j(\mathbf{x}_0, effort)) \end{pmatrix}$$

which does not exactly overlap with the $Aggregate\ Welfare$ curve making $\mathbf{x}_0^* = \arg\max u_i \neq \hat{\mathbf{x}}_0 = \arg\max Aggregate\ Welfare$ and thereby generating a contradiction since $\|\mathbf{x}_0^* - \hat{\mathbf{x}}_0\| > 0$. ■

Once the benchmark has been established it is necessary to explore what variables can affect and therefore modify the equilibrium outcome. The next section describes the comparative statics and other cases that can arise in this setting with this model.

3 The Comparative Statics

It is necessary to make the following assumptions regarding how effectiveness and the costs of lobbying will affect the effort invested by the special interest groups:

1. $\frac{\partial effort_j}{\partial effectiveness_j} > 0$
2. $\frac{\partial effort_j}{\partial costs} < 0$

The first condition above only implies that if the special interest group is more effective at lobbying then it will put more effort into that activity. The second relates the costs of lobbying to the effort invested, *i.e.* if the costs of lobbying rise then the special interest group will invest less time and effort into the activity.

There are three comparative static exercises that are of particular interest: what happens to the equilibrium policy vector when the weight assigned to $Aggregate\ Welfare$ changes $\left(\frac{dx_0^*}{d\alpha_{1i}}\right)$? What happens to the equilibrium policy vector when the weight assigned to $escalating$ changes $\left(\frac{dx_0^*}{d\alpha_{2i}}\right)$? What happens to the equilibrium policy vector when the effort invested by special interest groups changes $\left(\frac{dx_0^*}{deffort}\right)$?

To investigate the outcome in these three cases we proceed to totally differentiate the first order condition obtained from the politicians maximization problem. Recall the first order condition obtained was the following:

$$\frac{\partial \pounds_p}{\partial \mathbf{x}_0} = \left\{ \alpha_{1i} \frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} + I\{\cdot\}\, \alpha_{2i} \left(\begin{array}{c} \frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} + \\ \frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} \end{array} \right) \right\}$$

Before totally differentiating the first order condition, it is possible to calculate the second order condition to use it as an aid in obtaining the signs of the comparative static results. The second order condition is the following:

$$\frac{\partial \pounds_p^2}{\partial \mathbf{x}_0^2} = \alpha_{1i} \frac{\left(\frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} \right)}{\partial \mathbf{x}_0} + I\{\cdot\}\, \alpha_{2i} \left(\begin{array}{c} \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} \right)}{\partial \mathbf{x}_0} + \\ \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} \right)}{\partial \mathbf{x}_0} \end{array} \right) < 0$$

Since we are maximizing a strictly quasiconcave function the second order condition is negative. Additionally, the cross-partial derivatives of the first order condition will be of use in signing the comparative statics.

$$\begin{aligned}
\frac{\partial \pounds_p}{\partial \mathbf{x}_0 \partial \alpha_{1i}} &= \left\{ \begin{array}{c} \frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} + \alpha_{1i} \frac{\left(\frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} \right)}{\partial \alpha_{1i}} + \\ I\{\cdot\}\, \alpha_{2i} \left(\frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} \right)}{\partial \alpha_{1i}} + \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} \right)}{\partial \alpha_{1i}} \right) \end{array} \right\} > 0 \\
\frac{\partial \pounds_p}{\partial \mathbf{x}_0 \partial \alpha_{2i}} &= \left\{ \alpha_{1i} \frac{\left(\frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} \right)}{\partial \alpha_{2i}} + I\{\cdot\} \left(\begin{array}{c} \frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} + \\ \alpha_{2i} \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} \right)}{\partial \alpha_{2i}} + \\ \frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} + \\ \alpha_{2i} \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} \right)}{\partial \alpha_{2i}} \end{array} \right) \right\} \leq 0 \\
\frac{\partial \pounds_p}{\partial \mathbf{x}_0 \partial effort} &= \left\{ \alpha_{1i} \frac{\left(\frac{\partial u_i}{\partial AgWelfare} \frac{\partial AgWelfare}{\partial \mathbf{x}_0} \right)}{\partial effort} + I\{\cdot\}\, \alpha_{2i} \left(\begin{array}{c} \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial \mathbf{x}_0} \right)}{\partial effort} + \\ \frac{\left(\frac{\partial u_i}{\partial escalating} \frac{\partial escalating}{\partial U^j} \frac{\partial U^j}{\partial \mathbf{x}_0} \right)}{\partial effort} \end{array} \right) \right\} \leq 0
\end{aligned}$$

We ignore the constraints for now because they are not important for this exercise. Proceeding to totally differentiate the above expression we obtain the following very messy expression:

$$\left\{\begin{array}{c}
\left(\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0}+I\left\{\cdot\right\}\alpha_{2i}\left(\begin{array}{c}\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0}+\\ \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0}\end{array}\right)\right)d\mathbf{x}_0+\\
\left(\begin{array}{c}\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}+\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{1i}}+\\ I\left\{\cdot\right\}\alpha_{2i}\left(\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{1i}}+\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{1i}}\right)\end{array}\right)d\alpha_{1i}+\\
\left(\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{2i}}+I\left\{\cdot\right\}\left(\begin{array}{c}\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}+\\ \alpha_{2i}\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{2i}}+\\ \frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}+\\ \alpha_{2i}\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{2i}}\end{array}\right)\right)d\alpha_{2i}+\\
\left(\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial effort}+I\left\{\cdot\right\}\alpha_{2i}\left(\begin{array}{c}\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial effort}+\\ \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial effort}\end{array}\right)\right)deffort
\end{array}\right\}=0$$

From the messy expression above it is possible to obtain the following comparative static results.

$$\left(\frac{dx_0^*}{d\alpha_{1i}}\right)=-\frac{\left(\begin{array}{c}\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}+\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{1i}}+\\ I\left\{\cdot\right\}\alpha_{2i}\left(\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{1i}}+\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{1i}}\right)\end{array}\right)}{\left(\begin{array}{c}\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0}+\\ I\left\{\cdot\right\}\alpha_{2i}\left(\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0}+\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0}\right)\end{array}\right)}>0$$

Intuitively when the politician cares relatively more about society's welfare than climbing the political power ladder the distance between the equilibrium policy vector and the aggregate welfare maximizing policy vector should be small. Moreover, if this subjective weight increases this distance should become smaller and smaller.

$$\left(\frac{dx_0^*}{d\alpha_{2i}}\right) = -\frac{\left(\begin{array}{c} \alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{2i}} + \\ I\{\cdot\}\left(\begin{array}{c} \frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0} + \alpha_{2i}\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{2i}} + \\ \frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0} + \alpha_{2i}\frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \alpha_{2i}} \end{array}\right) \end{array}\right)}{\left(\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0} + I\{\cdot\}\alpha_{2i}\left(\begin{array}{c} \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0} + \\ \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0} \end{array}\right)\right)} \leq 0$$

In this case, intuition would imply that if the politician cares about his career advancement more than about society's welfare the distance between the equilibrium policy vector and the aggregate welfare maximizing one should be strictly greater than zero and as this subjective weight increases so will the distance. The outcome of this comparative static and the one above should go in opposite directions. Additionally, there is the extreme case when the politician only cares about maximizing society's welfare where this comparative static can have a value of zero. The equilibrium policy vector will not be modified by changes in α_{2i} because this argument is absent from the politician's utility function.

$$\left(\frac{dx_0^*}{deffort}\right) = -\frac{\left(\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial effort} + I\{\cdot\}\alpha_{2i}\left(\begin{array}{c} \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial effort} + \\ \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial effort} \end{array}\right)\right)}{\left(\alpha_{1i}\frac{\left(\frac{\partial u_i}{\partial AgWelfare}\frac{\partial AgWelfare}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0} + I\{\cdot\}\alpha_{2i}\left(\begin{array}{c} \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0} + \\ \frac{\left(\frac{\partial u_i}{\partial escalating}\frac{\partial escalating}{\partial U^j}\frac{\partial U^j}{\partial \mathbf{x}_0}\right)}{\partial \mathbf{x}_0} \end{array}\right)\right)} \leq 0$$

Finally, the intuition for this case would imply that as long as the politician's subjective weight on the escalating argument of this utility function is not zero then more effort by the special interest group would sway the equilibrium policy vector towards its preferred outcome thereby increasing the group's utility. Similarly as the above comparative static, in the extreme case where the politician only cares about maximizing society's welfare this comparative static can have a value of zero. The equilibrium policy vector will not be modified by changes in $effort$ by the interest groups because these arguments are absent from the politician's utility function.

4 Summary and Conclusions

The way economists model the policy setting process has evolved considerably. First attempts assumed benevolent dictators that would choose optimal policies. However, closer inspection showed the selected policies were less than optimal. The fact that these models were missing key players, such as interest groups caused them to be unable to portray the political process. In this paper we describe the political process with a two stage Stackelberg Leader-follower model general enough to allow for aggregate welfare maximization as well as office seeking or partisan politicians. The model establishes a theoretical way to measure the influence of special interest groups efforts to influence the policy setting process. The model was constructed in the spirit of the Grossman and Helpman model, however, in this case deadweight losses are fundamental to the outcome. These costs show up as the distance between the aggregate welfare maximizing policy vector and the equilibrium policy vector.

The model presents the full information case and establishes the benchmark situation that is used to compare all other possible policy states. It is clear that when politicians are perfectly matched with their functions there is no deadweight loss to society and the policy outcome is optimal. Therefore, job assignments inside bureaucracies should not be taken lightly. Moreover, the faster opportunistic behavior is identified the deadweight loss will be smaller for society.

At this point it is important to mention the caveats and issues that should not be taken lightly. The story presented here is our interpretation of what could possibly be happening inside bureaucracies during the policy setting process. The working hypothesis of the paper is that the politicians in charge of the policy setting/bargaining process face a trade-off between their personal objectives and the social objectives imposed by their job. Therefore, the observed outcome will differ from the optimal outcome when they have career advancement concerns. In the framework of this model that would imply they are not perfectly matched with their job. By no means, would this be the only explanation as other political economy models are able to provide different kinds of insights. However, the insights we have obtained so far do not contradict what would be expected. The next step is to include the asymmetric information case to compare how these results would be modified or not. After this step incorporating a voting rule or model would enhance the model and allow some speculation about the economy's growth process. Finally, the crucial step is to link the theory with empirics and what kind of testable hypotheses are able to fit this framework. Currently, we are searching for empirical applications.

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