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Japanese Policymaking Process with Bureaucrats*
— A Game Theoretic Approach —

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This paper develops a game theoretic model of the Japanese policymaking process with a ministry (i. e., bureaucrats) as an agenda setter. The existence of equilibrium strategies of the governing party and the median voter is proved. The existence of the possibility that the ministry chooses its less preferred proposal when faced with a small probability that its preferred policy be accepted is also proved.

1. Introduction

This paper attempts to provide answers to the following questions:

(1) How can we explain the influence of the elite bureaucrats in the Japanese policymaking process?

(2) Can consumer-voters influence the Japanese policymaking process in any way?

Most bills in Japan are drafted by bureaucrats, who are neither appointed nor fired by politicians or voters. Clearly, career bureaucrats' incentives to listen to voters are much smaller than politicians'. Additionally, bureaucrats are historically accorded high social status by virtue of their profession. Since Chalmers Johnson's seminal work about the Ministry of International Trade and Industry (Johnson, 1982), strong leadership by the elite bureaucrats has been considered one of the main reasons for Japan's postwar economic success. While their predecessors thought that any difference would eventually fade out, Johnson and other "revisionists" (e. g. Wolferen, 1989) stress that the Japanese politico-economic system has been controlled by elite bureaucrats and is fundamentally different from that in Western countries. The revisionists also consider this strong bureaucracy the leading cause of a producer-oriented as opposed to a consumer-oriented society. Since most bureaucrats spend their life in one ministry and then in a related industry after they retire from the ministry, they are, consciously or not, more concerned about the well-being of "their" industry than that of the general public. Critics of the Japanese economic and political

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system point to the high cost of living, the long working hours, and poor public goods as examples of a producer bias.

A recent trend in studies on the Japanese policymaking process, however, has recognized the growing number of pluralist elements in the Japanese political system. Evidence of this new pluralism is seen, for instance, in the fact that (i) various interest groups are expanding their influence on the policymaking process (Tsujinaka, 1988) ; (ii) there is competition and conflict among sub-governments (institutionalized relationships among segments of the bureaucracy, the dominant party, and interest groups sharing a common interest) (Aoki, 1988) ; (iii) politicians in the governing party are increasing their power by deepening their expertise and experience (Muramatsu and Kraus, 1987).

Although the pluralists' view is gaining support, proponents of the revisionists' view argue that the strengthened politicians and interest groups are just trying to influence the bureaucrats' discretionary power, and that the bureaucrats are still the most important players (Yamaguchi, 1993).

Calder (1988) offers three reasons for the existence of the two conflicting views on the Japanese policymaking process. They are

1) disorganization of the bureaucracy in some sectors formerly under the jurisdiction of the influential Home Ministry, abolished after World War II,
2) more than thirty years of continuous political dominance by the Liberal Democratic Party (LDP) and strengthening alignments of some ministries with specific LDP factions, and
3) cyclical changes between politicians and bureaucrats as driving forces of policymaking.

As for the third reason, Calder explains that in times of political turbulence, politicians take the initiative in policymaking, especially for welfare-oriented policies, and the stability-oriented bureaucrats and big businessmen defer to and even encourage such political initiative. In non-crisis periods, by contrast, politicians sense no need to take such initiative and the efficiency-oriented bureaucracy curtails the policies adopted during crisis periods. Although Calder's conclusion, based on his detailed study of several public policy areas, is convincing, the role of consumer-voters in Japanese policymaking is not clear. Some researchers might argue that the majority of Japanese consumers have supported the government's pro-business policy. The post World War II Japanese government made industrialization a priority in order to catch up with western countries. Industrialization brought the employees of Japanese industries (also consumers) rapid income increases and " lifetime " employment. Therefore, it may be argued that consumers have accepted the government policy.

Even if the consumer-voters' acceptance of the rapid industrialization policy is granted, their increasing frustration with politicians and elite bureaucrats for their poor handling of the recent economic and social depression is apparent. The political turmoil beginning in 1993, which marked the end of the almost forty years domination of government by the Liberal Democratic Party (LDP), also indicates some malfunction of the LDP-government's policymaking system.

Since I believe that Calder's view is the most accurate description of the Japanese policymaking process, this paper develops a model in which policy proposals are made only by bureaucrats (as in the revisionist's view) and politicians have veto power over them (a pluralistic factor). Although there are many theoretical models of political systems, most are based on the US or European systems. There are a few models of the Japanese political system, though. Aoki (1988) develops a bargaining-game model among ministries based on his Japanese-firm model. Cox (1994) and Cox and Niou (1994) studied the Japanese electoral system as an extension of the proportional representation model. These two models, however, cannot be the base for my analysis since one of the important features of my models is the asymmetric information among voters, politicians, and bureaucrats, which the above two models lack. In this paper, bureaucrats are the policy makers, and politicians are chiefly office seekers. This differs from the spatial theory, where politicians' own political positions are important factors in their decision-making (see Banks (1990) for a model introducing incomplete information in the spatial theory). The " setter " model (Romer and Rosenthal, 1978, Rosenthal 1990, Morris and Munger, forthcoming) is also one type of the spatial theory model. Although their model is similar to my models in that the agenda setter is important in both models, my models put less restrictions on the preference of the voters and focuses more on the agenda setter's " strategic " behavior to influence the electoral outcome. Furthermore, voters' policy preferences in my models change over time since they get new information about the efficacy of the chosen policy by observing the result. Models with interest groups (e. g. Austen-Smith, 1987, Denzau and Munger, 1986) are another potentially useful tool for analyzing the Japanese policymaking process. However, in this paper I will focus on the relationships between bureaucrats, politicians and voters disregarding the role played by interest groups.

Harrington (1993) develops an electoral model in which voters' voting decisions depend on both the observable economic policy of the incumbent politician and the result of the policy. The policy result is assumed to be per capital national income when the incumbent is in office. The key innovation in his model is to allow voters to be uncertain as to which economic policy generates more income. Furthermore, voters' policy preferences change over time since they get new information about the efficacy of the chosen policy by observing the result. The politician's utility depends on whether she holds office and on the level of per capital national income.

Although the model in this paper uses Harrington's modeling technique, the purpose of this paper is to analyze the influence of professional bureaucrats on policy choice. Therefore, the role of the incumbent politician in Harrington's model is separated into two roles and is carried by two players: the ministry (i. e., the bureaucrats) and the governing party (i. e., the politicians). The ministry makes a new policy proposal and the governing party either accepts it or rejects it. In rejecting the ministry's proposal the government ensures that the previous policy (i. e., the status quo) continues in effect. The ministry is independent of the governing party in the sense that the bureaucrats in the ministry are not appointed or fired by any politician. The ministry's utility depends only on (per capita national) income; however, the ministry and the government have, in general, different beliefs about the relative efficacies of the possible policies. The voters are unaware of the policymaking role of the ministry and, consequently, hold the government responsible for policy outcomes. A poor policy outcomes will cause the voters to elect the opposition party. Thus, not only the governing party but also voters can influence policymaking. As mentioned above, this model is a synthesis of the revisionist view (i. e., bureaucrats' policymaking) and the pluralist view (i. e., politicians' veto power) and shows that even though the ministry is independent of the governing party and voters, its policymaking is indirectly influenced by them.

2. Model

2. 1. Framework

There are only two players who make strategic choices; the ministry and the governing party. Although the model includes both voters and an opposition party, their decisions are non-strategic. The game is made up of the following stages:

1. The types of the ministry, the governing party, and the voters are chosen randomly (chosen by nature). Each strategic player is informed of all types.
2. The ministry chooses a proposal from the two element set $\{A, B\}$. This choice is observed by the governing party.
3. The governing party either adopts the ministry's proposal or causes the status quo (policy S) to continue in effect. The choice of the governing party and the consequent income level are observed by the voters.
4. The voters choose between the governing party and the opposing party. However, beliefs of the voters about the opposing party are not affected by choices at earlier stages because these earlier decisions reveal no new information about the opposition party.

For each player, each of the three policies, A, B, S, is associated with a distinct income $Y_\iota(x)$, $x \in \{A, B, S\}$, $\iota \in \{$voters, political parties, the ministry$\}$. $Y_\iota(x)$ is a random variable: $Y_\iota(x) = Y^o + C(\omega_\iota(x) + \varepsilon)$ where $\varepsilon \sim N(0, \sigma^2\varepsilon)$, Y^o and C are positive constants and $\omega_\iota(x) \in [0, 1]$, is a constant to the player itself if the player is a political party or the ministry. If the player is a voter, $\omega_\iota(x)$ is a random variable (even to the player herself) with a distinct mean, μ^x, and the same variance, σ^2. Each player's evaluation of $\omega_\iota(x)$ and the other players' expectations of it are discussed in the next section. We may, without loss of generality, use a normalization of income given by $y_\iota(x) = (Y_\iota(x) - Y^o)/C$ for $x \in \{A, B, S\}$.[1]

It is plausible that an ordinary (not well-informed) voter's belief about the result of a policy depends on the alternative policy under consideration. For instance, if the ministry's proposal is an aggressive fiscal policy, the voter's expected income associated with the status quo could be lower than that if the proposal is a very conservative fiscal policy, since the status quo looks more conservative in the former case.

2. 2. Actors

As noted above, the actors include the voters, the governing party, the opposition party, and the ministry. Each is described in detail in the next four subsections.

2. 2. 1. The Voters

An individual voter is assumed to vote for the party that she expects to pursue the policy causing higher income. Thus, the election occurs in a single issue space in which the preferences of the median voter decide the outcome. Voters have prior beliefs about the relative merits of policy A versus S and of policy B versus S which were described above. For policy A, the parameter μ^A represents a voter's belief. Policy A looks better than policy S to such a voter if $\mu^A > 1/2$ because the mean of $y(A)$ exceeds the mean of $y(S)$ if and only if $\mu^A > 1/2$. When the ministry's proposal is $z \in \{A, B\}$, the voter's belief is that the mean of the normalized income, $\omega(z)$, associated with policy z is distributed as $N(\mu^z, \sigma^2)$ and that the mean of the normalized income, $\omega(S)$, associated with policy S is distributed as $N(1-\mu^z, \sigma^2)$. Thus, each voter has her own belief about the true value of μ^z and all voters' beliefs lie in the interval $[0, 1]$.

The ministry and the governing party believe that the location of the median voter is represented by the differentiable cumulative distribution $G^A(\cdot) : [0, 1] \rightarrow$

1) Since which player is being discussed is clear, the subscrpt ι is omitted in the rest of the paper.

[0, 1]. The function $G^B(\cdot)$ has a similar meaning in comparing B and S. The beliefs of voters are probabilistic, so that μ^z represents the mean of a normal distribution for the voter.

After voters observe which policy the governing party chose, they infer the probability that the party will choose the same policy again if it wins the election. Voters also reevaluate the efficacy of the policy the governing party chose after income is realized. Then, they vote.

2. 2. 2. The Governing Party

The governing party cares about holding office and about the level of voters' income y, and is risk neutral. The party cares about voters' income because it is positively related to its own income. For modeling purposes, the existence of an incentive other than holding office is important because it gives the party a reason to choose a policy in its second, i. e., its last, term. More realistically, the party cares about voters' income in its second term because the party wants to be the majority party forever although that is beyond the framework of this model. Let k denote the value attached to holding office. The utility to the governing party is y+k where k>0. Because of the presence of k the party does not necessarily choose the best policy in terms of resulting income. The governing party is characterized by its beliefs, (α^A, α^B). A type (α^A, α^B) governing party believes with certainty that

$$(\omega(A), \omega(S)) = (\alpha^A, 1-\alpha^A), \ \alpha^A \in [0, 1]$$

if the proposed policy is A, and believes with certainty that

$$(\omega(B), \omega(S)) = (\alpha^B, 1-\alpha^B), \ \alpha^B \in [0, 1]$$

if the proposed policy is B. The value of α^z thus represents the party's evaluation of the efficacy of policy $z \in \{A, B\}$ and is private information. If $\alpha^z > 1/2$, the party thinks proposal z is better than the status quo policy in terms of resulting income. Proposal B can be better or worse than policy A for the party.

The governing party's type α^z is determined by a pair of independent, random draws from [0, 1] chosen according to the continuous cumulative distribution functions $F^z(\cdot): [0, 1] \to [0, 1]$, z=A, B.[2] Thus, the ministry's and voters' prior expectations of the governing party's type are represented by F^A and F^B.

2. 2. 3. The Opposition Party

In this model the opposition party makes no strategic choice. Although this passiveness of the opposition party is primarily for the sake of simplicity, it fits

2) Because the governing party never chooses between A and B, but, instead, chooses between z and S where $z \in \{A, B\}$ is presented to it by the ministry, I will often take the liberty of referring to the governing party as type α^z where z is the ministry's prior choice.

the Japanese opposition parties until recently, especially the largest among them, the Japan Socialist Party (JSP, presently the Social Democratic Party of Japan, SDPJ). The JSP remained a fundamentalist opposition party for almost four decades. We can think of the governing party as the LDP and the opposition party as the JSP.

Since voters and the ministry have little information about the opposition party's policy preference, let us assume that the other players' expectations of the opposition party's evaluation of either of the two policies is 1/2.

2.2.4. The Ministry

The elite bureaucrats in a ministry make policy proposals. They are career bureaucrats; hence, they are neither appointed nor fired by the politician. The bureaucrats pursue their own interests which are independent of those of the governing party or voters. They are reviewed and promoted by the personnel office (or their superiors) during their entire careers in the ministry. The personnel office also finds jobs for them after their retirement from the ministry. Thus, their career opportunities exist only inside the ministry and within its jurisdiction. Therefore, it is natural for them to share the interest of the ministry while they are pursuing their careers there. The ministry does not necessarily share the interest of the general public. In this model, for simplicity, I assume that the ministry's utility level coincides with its evaluation of the policy which is chosen by the governing party. Type-β ministry believes with certainty that

$$(\omega(A),\ \omega(B),\ \omega(S)) = (\beta,\ 1/2,\ 1-\beta),\ \beta \in (1/2,\ 1).$$

The reason for limiting the value of β between 1/2 and one is that the analysis when $\beta \in (0,\ 1/2)$ is identical except that the roles of A and S are reversed. The ministry cares about the governing party's and voters' policy interests since the party can reject the ministry's policy proposal and voters can vote out the governing party. The main question in this chapter is to determine if it is possible for the ministry, which monopolizes the proposal making process, to choose its less preferred proposal B instead of its preferred proposal A.

3. Game

In this section the specific choices of the two strategic agents and the voters are spelled out and their payoff function are specified. Section 3.1 examines the ministry, Section 3.2 deals with the governing party, and Section 3.3 deals with the voters. It will be seen that the voters present a more complex situation because they will receive information that leads them to revise their beliefs. Finally, Section 3.4 spells out the beliefs that the ministry and the governing party have concerning the probabilities attached to the choices the voters will make.

3. 1. The Ministry's Choice

The ministry chooses a proposal, for example policy A, which the governing party can accept or reject; however, if A is rejected, the status quo, called policy S remains in effect. In either case, the governing party might or might not win the election at the beginning of the second period depending on the resulting income in the first period and the voters' revised preference over the two policies. Voters revise their preferences because they observe the result of the implemented policy. The ministry also considers the opposition party's policy preferences in case the governing party loses the election. Thus, the ministry's expected utility when it chooses proposal A is

$$
\begin{aligned}
(1)\quad E[U|\beta,A] &= \eta_1(A)(\beta+\delta\{\lambda^m(\beta,A,A)[\eta_2(A|A,A)\beta+\{1-\eta_2(A|A,A)\}(1-\beta)] \\
&\quad +[1-\lambda^m(\beta, A, A)][\beta f^A+(1-\beta)(1-f^A)]\}) \\
&\quad +[1-\eta_1(A)](1-\beta+\delta\{\lambda^m(\beta, S, A)([1-\eta_2(S|A, S)]\beta \\
&\quad +\eta_2(S|A, S)[1-\beta])+[1-\lambda^m(\beta, S, A)][\beta f^A+(1-\beta)(1-f^A)]\}) \\
&= (2\beta-1)\eta_1(A)+(1-\beta)(1+\delta) \\
&\quad +(2\beta-1)\delta\{\eta_1(A)\lambda^m(\beta, A, A)[\eta_2(A|A, A)-f^A] \\
&\quad +[1-\eta_1(A)]\lambda^m(\beta, S, A)[1-f^A-\eta_2(S|A, S)]+f^A\},
\end{aligned}
$$

where

$\eta_1(z)$: a type-β ministry's subjective probability that the governing party accepts proposal $z\in\{A, B\}$ at period 1,

$1-\eta_1(z)$: a type-β ministry's subjective probability that the governing party chooses policy S, i.e., rejects proposal z, at period 1,

$\eta_2(x|z, x')$: a type-β ministry's subjective probability that the governing party chooses policy $x\in\{z, S\}$ at period 2 after choosing policy $x'\in\{z, S\}$ at period 1 when the ministry's proposal at period 1 was z,

$\lambda^m(\beta, x, z)$: a type-β ministry's subjective probability that the governing party wins the election when it chooses policy x and when the ministry's proposal is z,

$1-\lambda^m(\beta, x, z)$: a type-β ministry's subjective probability of the opposition party's winning when the governing party chooses policy x when the ministry's proposal is z,

$\delta\in[0, 1]$: the discount factor,

f^z : a type-β ministry's subjective probability that the opposition party chooses policy $z\in\{A, B\}$ if it wins.

Likewise, the ministry's expected utility when it chooses proposal B is

$$(2)\quad E[U|\beta, B]=\eta_1(B)(1/2+\delta\{\lambda^m(\beta, B, B)[\eta_2(B|B, B)/2$$

$$
\begin{aligned}
&+\{1-\eta_2(\mathrm{B}|\mathrm{B},\ \mathrm{B})\}(1\text{-}\beta)]+[1-\lambda^{\mathrm{m}}(\beta,\ \mathrm{B},\ \mathrm{B})][f^{\mathrm{B}}/2\\
&+(1-f^{\mathrm{B}})(1-\beta)]\})\\
&+[1-\eta_1(\mathrm{B})](1-\beta+\delta\{\lambda^{\mathrm{m}}(\beta,\ \mathrm{S},\ \mathrm{B})([1-\eta_2(\mathrm{S}|\mathrm{B},\ \mathrm{S})]/2\\
&+\eta_2(\mathrm{S}|\mathrm{B},\ \mathrm{S})[1-\beta])+[1-\lambda^{\mathrm{m}}(\beta,\ \mathrm{S},\ \mathrm{A})][f^{\mathrm{B}}/2+(1-f^{\mathrm{B}})(1-\beta)]\})\\
&=(\beta-1/2)\eta_1(\mathrm{B})+(1-\beta)(1+\delta)\\
&+(\beta-1/2)\delta\{\eta_1(\mathrm{B})\lambda^{\mathrm{m}}(\beta,\ \mathrm{B},\ \mathrm{B})[\eta_2(\mathrm{B}|\mathrm{B},\ \mathrm{B})-f^{\mathrm{B}}]\\
&+[1-\eta_1(\mathrm{B})]\lambda^{\mathrm{m}}(\beta,\ \mathrm{S},\ \mathrm{B})[1-f^{\mathrm{B}}-\eta_2(\mathrm{S}|\mathrm{B},\ \mathrm{S})]+f^{\mathrm{B}}\}.
\end{aligned}
$$

Let us define that $\xi(\beta)\equiv \mathrm{E}[\mathrm{U}|\beta,\ \mathrm{A}]-\mathrm{E}[\mathrm{U}|\beta,\ \mathrm{B}]$.

$$
\begin{aligned}
\xi(\beta)=&(2\beta-1)\eta_1(\mathrm{A})+(1-\beta)(1+\delta)\\
&+(2\beta-1)\delta\{\eta_1(\mathrm{A})\lambda^{\mathrm{m}}(\beta,\ \mathrm{A},\ \mathrm{A})[\eta_2(\mathrm{A}|\mathrm{A},\ \mathrm{A})-f^{\mathrm{A}}]\\
&+[1-\eta_1(\mathrm{A})]\lambda^{\mathrm{m}}(\beta,\ \mathrm{S},\ \mathrm{A})[1-f^{\mathrm{A}}-\eta_2(\mathrm{S}|\mathrm{A},\ \mathrm{S})]+f^{\mathrm{A}}\}\\
&-(\beta-1/2)\eta_1(\mathrm{B})+(1-\beta)(1+\delta)\\
&-(\beta-1/2)\delta\{\eta_1(\mathrm{B})\lambda^{\mathrm{m}}(\beta,\ \mathrm{B},\ \mathrm{B})[\eta_2(\mathrm{B}|\mathrm{B},\ \mathrm{B})-f^{\mathrm{B}}]\\
&+[1-\eta_1(\mathrm{B})]\lambda^{\mathrm{m}}(\beta,\ \mathrm{S},\ \mathrm{B})[1-f^{\mathrm{B}}-\eta_2(\mathrm{S}|\mathrm{B},\ \mathrm{S})]+f^{\mathrm{B}}\}.
\end{aligned}
$$

A type-β ministry chooses proposal A if $\xi(\beta)\geqq 0$ and chooses proposal B if $\xi(\beta)<0$. As shown in Section 4.2 there are conditions under which there exists β such that $\xi(\beta)<0$ as well as β such that $\xi(\beta)\geqq 0$.

3.2. The Governing Party's Choice

The governing party decides whether it accepts the ministry's proposal or not. It is concerned with winning the election and with the result of the policy; that is income. If the governing party likes the proposal, and it thinks voters will also like it, there is no problem in accepting the proposal. However, if the policy preferences of voters and the party are different, the governing party must decide whether it is more desirable to adopt the better policy and lose the election or to adopt the worse policy and win the election. In both cases the governing party must take account of the possibility that the opposition party may choose the governing party's preferred policy in the second period.

If reelected, however, the governing party will not necessarily make the same decision it makes in the first period. Since, in this two period model, the party has no more elections to worry about, its decision depends only on its evaluation of the proposal in terms of income.

Keeping all these factors in mind, the governing party calculates its expected utility when it faces the ministry's proposal. Thus, a type $(\alpha^{\mathrm{A}},\ \alpha^{\mathrm{B}})$ governing party's expected utility when it accepts the ministry's proposal $\mathrm{z}\in\{\mathrm{A},\ \mathrm{B}\}$ is

(3) $\mathrm{E}[\mathrm{U}|\alpha^{\mathrm{z}},\ \mathrm{z},\ \mathrm{z}]=(\alpha^{\mathrm{z}}+\mathrm{k})+\delta\{\lambda(\alpha^{\mathrm{z}},\ \mathrm{z},\ \mathrm{z})[\max\{\alpha^{\mathrm{z}},1-\alpha^{\mathrm{z}}\}+\mathrm{k}]$

$$+[1-\lambda(\alpha^z, z, z)][f^z\alpha^z+(1-f^z)(1-\alpha^z)]\},$$

where

$\lambda(\alpha^z, x, z)$: the governing party's subjective probability of winning the election when it chooses policy $x=\{A, B, S\}$ when the ministry's proposal is $z\in\{A, B\}$.

When the party rejects the ministry's proposal $z\in\{A, B\}$, i. e., chooses policy S, its expected utility is

$$(4) \quad E[U|\alpha^z, S, z]=(1-\alpha^z+k)+\delta\{\lambda(\alpha^z, S, z)[\max\{\alpha^z, 1-\alpha^z\}+k] +[1-\lambda(\alpha^z, S, z)][f^z\alpha^z+(1-f^z)(1-\alpha^z)]\}.$$

Let us define that $\psi(\alpha^z, z)\equiv E[U|\alpha^z, z, z]-E[U|\alpha^z, S, z]$.

$$\psi(\alpha^z, z)=2\alpha^z-1+\delta\Delta(\alpha^z, z)\{[\max\{\alpha^z, 1-\alpha^z\}+k]-[f^z a^z+(1-f^z)(1-\alpha^z)]\}$$

where $\Delta(\alpha^z, z)\equiv\lambda(\alpha^z, z, z)-\lambda(\alpha^z, S, z)$. Thus, the governing party will choose policy $z\in\{A, B\}$ if and only if $\psi(\alpha^z, z)\geq 0$.

Assume there exists α^{z*} such that $\psi(\alpha^{z*}, z)=0$ and $\alpha^{z*}\in(0, 1)$. Since, as we will see later, $\lambda(\alpha^z, z, z)$ is a monotone increasing function of α^z and $\lambda(\alpha^z, S, z)$ is a decreasing function of α^z, $\Delta(\alpha^z, z)$ and, thus, $\psi(\alpha^z, z)$ is an increasing function of α^z.[3] Therefore, we can divide α^z into the two sets:

(i) the set of α^z that represents the types of the governing party which accept the ministry's policy, $\alpha_{zz}=\{\alpha^z|\alpha^z\geq\alpha^{z*}\}$, and

(ii) the set of α^z that represents the types of the governing party which reject the ministry's policy, thus, choose the status quo, $\alpha_{sz}=\{\alpha^z|\alpha^z<\alpha^{z*}\}$.

Since α^z is drawn from the distribution function $F^z(\cdot)$, a type-β ministry's subjective probability of α^z being in α_{zz} is

$$\eta_1(\beta, z)=1-F^z(\alpha^{z*}).$$

This is the ministry's (and voters') subjective probability that a type-α^z governing party accepts the ministry's proposal z at period 1. The ministry's subjective probability of α^z being in α_{sz}, i. e., the probability that the party rejects proposal z, is

$$1-\eta_1(z)=F^z(\alpha^{z*}).$$

At period 2, the party will choose policy z if $\alpha^z\geq 1/2$. Since α^{z*} can be greater, or less than or equal to 1/2, when the governing party accepts proposal z at period 1, the ministry's subjective probability that the party will choose policy z at period 2 is

3) See page 103.

$$\eta_2(z|z,\ z)=[1-F^z(\max\{1/2,\ \alpha^{z*}\})]/\eta_1(z).$$

On the other hand, the party will choose policy S if $\alpha^z<1/2$. The ministry's subjective probability that the party will choose policy S at period 2 when the governing party accepts proposal A at period 1 is $1-\eta_2(S|z,\ z)$.[4]

Likewise, the ministry's subjective probability that the party will choose policy S at period 2 when the governing party chooses policy S (or rejects proposal z) at period 1 is

$$\eta_2(S|z,\ S)=F^z(\min\{1/2,\ \alpha^{z*}\})/[1-\eta_1(z)].$$

The ministry's subjective probability that the party will choose policy z at period 2 when the governing party rejects proposal z at period 1 is $1-\eta_2(z|z,\ S)$.

3. 3. Voters' Choice

The voters must determine their estimates of the effectiveness of the various policies. While they begin with prior beliefs, before the election they observe the policy carried out by the governing party. Although voters know that the ministry is an important actor in the policymaking process, the voters are unaware that it determines which new policy the government considers. The voters also observe income during the term of the governing party. Their posterior beliefs are taken up in Subsection 3. 3. 1. Their new information permits them to revise their beliefs about the future policy that the governing party would select if it were reelected. This is examined in Subsection 3. 3. 2.

3. 3. 1. Voters' Policy Preference

After observing the chosen policy and their realized income, type-μ^z voters reevaluate the efficacy of policy $x\in\{z,\ S\}$, i.e., $\omega(x)$. Since voters know the value of y after the policy is implemented, the Bayesian estimator of the reevaluated $\omega(x)$ is specified as follows under the normality assumptions:[5]

$$\text{(5)} \qquad E[\omega(z)\,|\,y,\ \mu^z]=\rho y+(1-\rho)\mu^z,\ z\in\{A,\ B\}$$

$$\text{(6)} \qquad E[\omega(S)\,|\,y,\ \mu^z]=\rho y+(1-\rho)(1-\mu^z),\ z\in\{A,\ B\}$$

where $\rho\equiv\sigma^2/(\sigma^2+\sigma_\varepsilon^2)$.

When the chosen policy in the first period is policy z, type-μ^z voters' new expectation of policy z is $\rho y+(1-\rho)\mu^z$. If the voters' new expectation of policy z is greater than that of policy S, type-μ^z voters want policy z to be implemented again in the second period. That is

4) In this model the ministry makes a proposal just once. Thus, there is no new proposal at the second period.

5) About Bayesian estimators, see, for example, Freund and Walpole (1987) Section 10. 8.

(7) $$\rho y+(1-\rho)\mu^z \geqq 1-\mu^z.$$

Type-μ^z voters' expectation of $\omega(S)$ is still $1-\mu^z$ since policy S was not implemented in the first period. They have no new information about the efficacy of the policy S.

Equation (7) can be also expressed as

(7') $$y \geq \underline{y}_z(\mu^z) \equiv \mu^z + (2/\rho)(1/2-\mu^z).$$

Thus, if μ^z satisfies (7'), type-μ^z voters want policy z to be implemented again in the second period. Since $\underline{y}_z(\mu^z)$ is a decreasing function of μ^z and y can be any real number, we can divide μ^z into the two sets based on whether μ^z satisfies (7').

Similarly, when x=S, type-μ^z voters' new expectation of policy S is $\rho y+(1-\rho)(1-\mu^z)$. Type-μ^z voters want policy S to be implemented again in the second period if

(8) $$\rho y+(1-\rho)(1-\mu^z) \geqq \mu^z$$

or

(8') $$y \geq \underline{y}_{sz}(\mu^z) \equiv 1-\mu^z-(2/\rho)(1/2-\mu^z).$$

Since $\underline{y}_{sz}(\mu^z)$ is an increasing function of μ^z and y can be any real number, we can also divide μ^z into the two groups. Integrating two sets, we have two redefined " types " of voters: voters who want the same policy again and voters who do not. However, more information is necessary for voters to decide which candidates, i. e., the governing party or the opposition party, they will vote for.[6] Note that the voters base their decisions on their views of the relative merits of S and the one policy selected by the ministry. The remaining policy simply does not exist as far as voters are concerned.

3. 3. 2. Voters' Expectation about The Governing Party's Policy Choice

If voters observe that the governing party implemented policy $z \in \{A, B\}$ in its first-term, they will infer that the governing party's type lies in $(\alpha^{z*}, 1]$. The voter's subjective probability that the governing party's type lies in $(\alpha^{z*}, 1]$ is $1-F^z(\alpha^{z*})$. Voters believe that if reelected, the governing party will implement policy z if and only if $\alpha^z \geqq 1/2$. Since $\alpha^{z*} \geqq 1/2$ and $\alpha^{z*} < 1/2$ are both possible, voters' subjective probability that the governing party will choose policy z if reelected is

6) Since voters in this model have only two choices they must choose one of two parties, i. e., the governing or the opposition party.

(9) $$\eta_2(z|z,\ z)=[1-F^z(\max\{1/2,\ \alpha^{z*}\})]/[1-F^z(\alpha^{z*})]$$

where $\eta_2(z|z,\ z)$ is the voters' subjective probability that the governing party will choose policy z if reelected when it chooses policy z at period 1. Their subjective probability that the governing party will choose policy S if reelected (when $x=z$) is $\eta_2(S|z,\ z)=1-\eta_2(z|z,\ z)$.

Since voters have no information about the opposition party's policy preference, they assign probability $f^z=1-F^z(1/2)$ to the opposition party implementing policy z.

If $\alpha^{z*}<1/2$,

$$\begin{aligned}\eta_2(z|z,\ z)-f^z&=[1-F^z(1/2)]/[1-F^z(\alpha^{z*})]-[1-F^z(1/2)]\\&\geq[1-F^z(1/2)]F^z(\alpha^{z*})/[1-F^z(\alpha^{z*})]\\&\geq 0.\end{aligned}$$

If $\alpha^{z*}\geq 1/2$,

$$\begin{aligned}\eta_2(z|z,\ z)-f^z&=[1-F(\alpha^{z*})]/[1-F(\alpha^{z*})]-[1-F^z(1/2)]\\&=F^z(1/2)\\&\geq 0.\end{aligned}$$

Since $\eta_2(S|z,\ z)=1-\eta_2(z|z,\ z)$, $\eta_2(S|z,\ z)-[1-f^z]=f^z-\eta_2(z|z,\ z)\leq 0$. Thus, when the governing party chooses policy z in the first period, voters think that the governing party is more likely than the opposition party to choose policy z in the second period and that the governing party is less likely than the opposition party to choose policy S in the second period.

When $x=z$, voters will vote for the governing party if and only if

$$\begin{aligned}&\eta_2(z|z,\ z)[\rho y+(1-\rho)\mu^z]+[1-\eta_2(z|z,\ z)][1-\mu^z]\\&\geq f^z[\rho y+(1-\rho)\mu^z]+(1-f^z)(1-\mu^z),\end{aligned}$$

or,

$$[\eta_2(z|z,\ z)-f^z][\rho y+(1-\rho)\mu^z]\geq[\eta_2(z|z,\ z)-f^z](1-\mu^z).$$

Since $\eta_2(z|z)-f^z\geq 0$, voters will vote for the governing party if and only if

$$\rho y+(1-\rho)\mu^z\geq 1-\mu^z.$$

This is exactly the inequality (7). Therefore, if voters want policy z again (i. e., $y\geq\underline{y}_z$), they will vote for the governing party. Since voters have only two choices, i. e., the governing party and the opposition party, if they do not want policy z (i. e., $y<\underline{y}_z$) they will vote for the opposition party.

When the government chooses S and the proposal is z,

(10) $$\eta_2(S|z,\ S)=F^z(\min\{1/2,\ \alpha^{z*}\})/F^z(\alpha^{z*}).$$

If $\alpha^{z*}\geq 1/2$,

$$\begin{aligned}\eta_2(S|z,\ S)-(1-f^z)&=F^z(\alpha^{z*})/F^z(\alpha^{z*})-F^z(1/2)\\&=1-F^z(1/2)\\&\geq 0.\end{aligned}$$

If $\alpha^{z*}<1/2$,

$$\eta_2(S|z,\ S)-(1-f^z)=F^z(1/2)/F^z(\alpha^{z*})-F^z(1/2)$$
$$=F^z(1/2)[1-F^z(\alpha^{z*})]/F^z(\alpha^{z*})$$
$$\geq 0.$$
$$\eta_2(z|z,\ S)-f^z=1-f^z-\eta_2(S|z,\ S)<0.$$

Combining the two cases for the policies z and S, we have the following Lemma.

LEMMA 1: When the governing party politician chooses policy S(z) in the first period, voters think that governing party is more likely than the opposition party to choose policy S(z) in the second period and therefore that governing party is less likely than the opposition party to choose policy z(S) in the second period.

When policy S is chosen in the first period and the proposal is z, voters will vote for the governing party if and only if

$$\eta_2(S|z,\ S)[\rho y+(1-\rho)(1-\mu^z)]+[1-\eta_2(S|z,\ S)]\mu^z$$
$$\geq(1-f^z)[\rho y+(1-\rho)(1-\mu^z)]+f^z\mu^z,$$

or,

$$[\eta_2(S|z,\ S)-(1-f^z)][\rho y+(1-\rho)(1-\mu^z)]\geq[\eta_2(S|z,S)-(1-f^z)]\mu^z.$$

Since $\eta_2(S|z,\ S)-(1-f^z)\geq 0$, voters will vote for the governing party if and only if

$$\rho y+(1-\rho)(1-\mu^z)\geq\mu^z. \quad \text{(inequality (8))}$$

Therefore, if voters want policy S again (i.e., $y\geq\underline{y}_{sz}$), they will vote for the governing party. If not (i.e., $y<\underline{y}_{sz}$), they will vote for the opposition party.

Combining the analyses about voters' posterior expectations of the policies and about voters' expectations of the governing party's future policy intention, we can rename the two voter "types", i.e., voters who will vote for the governing party and voters who will vote for the opposition party:

$$\mu_g=\{\mu^z|y\geq\underline{y}_x\} \text{ and } \mu_o=\{\mu^z|y<\underline{y}_x\},\ x\in\{z,\ S\} \text{ and } z\in\{A,\ B\}.$$

3. 4. The Strategic Players' Beliefs about Voters' Choice

The governing party's belief about voter's voting decision is spelled out in Section 3. 4. 1 and that of the ministry in Section 3. 4. 2.

3. 4. 1. The Governing Party's Subjective Probability of Voters' Voting Decision

If the median voter prefers the governing party and x=z then, since $\underline{y}_z(\mu^z)$ is decreasing in μ^z, all those voters whose type is greater than or equal to the median voter's type will also vote for the governing party. If the median voter prefers the governing party and x=S, since $\underline{y}_{sz}(\mu^z)$ is increasing in μ^z, all those voters whose type is smaller than or equal to the median voter's type will also vote for the governing party. Thus, in terms of the election, only the median voter matters.

As shown earlier, voters infer that if the governing party chooses policy z in its first term, then it is more likely than the opposition party to implement policy z in the second period. Thus, when x=z, reelection occurs if and only if the type-μ^z median voter's posterior expectation of policy z is greater than that of policy S, i.e., the voter prefers policy z to policy S. That is,

$$\begin{aligned} E[\omega(z)\,|\,y,\ \mu^z] &= \rho y + (1-\rho)\mu^z \\ &= \rho(\omega(z)+\varepsilon) + (1-\rho)\mu^z \\ &\geqq 1-\mu^z, \end{aligned}$$

or

$$\varepsilon \geq (2/\rho)(1/2-\mu^z) + \mu^z - \omega(z).$$

Since a type-α^z governing party believes $\omega(z)=\alpha^z$,

$$\varepsilon \geq (2/\rho)(1/2-\mu^z) + \mu^z - \alpha^z.$$

Let H[•] denote the cumulative distribution function of ε, then the type-α governing party's subjective probability of winning the election when it chooses policy x=z when the ministry's proposal is z∈{A, B} is

$$\text{(11)} \qquad \lambda(\alpha^z,\ z,\ z) = \int_0^1 \{1\text{-}H([2/\rho][1/2\text{-}\mu^z] + \mu^z\text{-}\alpha^z)\} G^{z\prime}(\mu^z)\,d\mu^z.$$

$\lambda(\alpha,\ z,\ z)$ is increasing in α^z and continuous.

When x=S reelection occurs if and only if

$$\begin{aligned} E[\omega(S)\,|\,y, \beta, \mu^z] &= \rho y + (1-\rho)(1-\mu^z) \\ &= \rho(\omega(S)+\varepsilon) + (1-\rho)(1-\mu^z) \\ &\geq \mu^z, \end{aligned}$$

or

$$\varepsilon \geq -(2/\rho)(1/2-\mu^z) + (1-\mu^z) - \omega(S).$$

Since a type-α^z governing party believes $\omega(S)=(1-\alpha^z)$

$$\varepsilon \geq -(2/\rho)(1/2-\mu^z) - \mu^z + \alpha^z.$$

Then,

$$\text{(12)} \qquad \lambda(\alpha,\ S,\ z) = \int_0^1 \{1-H(-[2/\rho][1/2-\mu^z] - \mu^z + \alpha^z)\} G^{z\prime}(\mu^z)\,d\mu^z.$$

$\lambda(\alpha,\ S,\ z)$ is decreasing in α and continuous.

3.4.2. The Ministry's Subjective Probability of The Voters' Voting Decision

We can get the ministry's subjective probability of voters' voting decisions by replacing the type-α governing party's beliefs about $\omega(x)$ in the party's subjective probability of voter's voting decisions with that of the type β ministry's. Thus,

$$\text{(13)} \qquad \lambda^m(\beta,\ A,\ A) = \int_0^1 \{1-H([2/\rho][1/2-\mu^A] + \mu^A - \beta)\} G^{A\prime}(\mu^A)\,d\mu^A,$$

(14) $$\lambda^{m}(\beta,\ S,\ A)=\int_0^1\{1-H(-[2/\rho][1/2-\mu^{A}]-\mu^{A}+\beta))\}G^{A'}(\mu^{A})\,d\mu^{A},$$

(15) $$\lambda^{m}(\beta,\ B,\ B)=\int_0^1\{1-H([2/\rho][1/2-\mu^{B}]+\mu^{B}-1/2)\}G^{B'}(\mu^{B})\,d\mu^{B},$$

(16) $$\lambda^{m}(\beta,\ S,\ B)=\int_0^1\{1-H(-[2/\rho][1/2-\mu^{B}]-\mu^{B}+\beta)\}G^{B'}(\mu^{B})\,d\mu^{B}.$$

4. Results

The equilibrium strategies of the governing party and the equilibrium behavior of the voters are described in Section 4. 1. The ministry's equilibrium strategy is developed in Section 4. 2. As the main interest in this model concerns whether the ministry would, in equilibrium, choose its less favored policy in an effort to influence the outcome of the election, it is important to attempt to characterize the nature of equilibrium. Section 4. 2 contains a partial characterization of equilibrium and sheds light on this question by giving conditions under which particular sorts of equilibria will exist.

4. 1. Equilibrium Strategies in the Election Game

Let us first summarize the strategies of the governing party and voters (See Figure 1). The governing party's equilibrium strategy for policy choice is

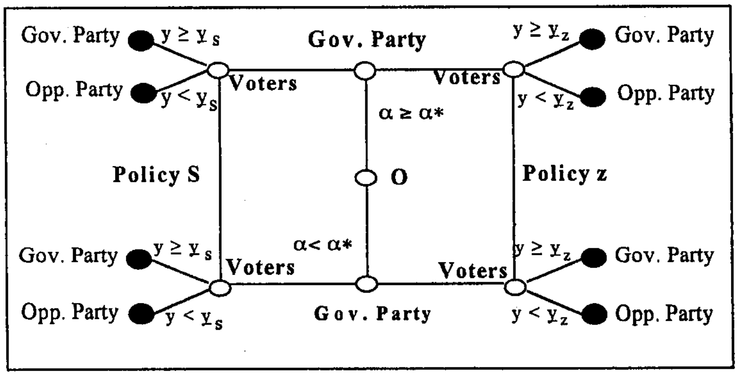

Figure 1. Reelection Game

(17) $$x^{*}(\alpha^{z},\ \beta)=\begin{cases}S \text{ if } \alpha^{z}\in[0,\ \alpha^{z*})\\ z \text{ if } \alpha^{z}\in[\alpha^{z*},\ 1],\end{cases}$$

$z\in\{A,\ B\}$ and $\alpha^{z*}\in(0,\ 1)$.

Voters' equilibrium voting strategy is

(18) $$t^{*}(\mu^{z},\ x,\ y)=\begin{cases}\text{governing party if } y\geq \underline{y}_{x}(\mu^{z})\\ \text{opposition party if } y<\underline{y}_{x}(\mu^{z}),\end{cases}$$

$x\in\{z,\ S\}$ and $z\in\{A,\ B\}$.

THEOREM 1: There is a value $\bar{k} \geq 0$ such that if k, the value attached to holding office, is less than $\bar{k}$, then, there exists $\alpha^{z*} \in (0, 1)$ such that (17) and (18) is consistent with a perfect Bayesian equilibrium. If α^{z*} exists, then it is unique.

PROOF

$\psi(\alpha^z, z) \equiv E[U|\alpha^z, z, z] - E[U|\alpha^z, S, z]$ where $E[U|\alpha^z, x, z]$ is the governing party's expected utility when its type is α^z and it chooses policy x.

$$\psi(\alpha^z, z) = 2\alpha^z - 1 + \delta\Delta(\alpha^z, z)\{[\max\{\alpha^z, 1-\alpha^z\} + k] - [f^z\alpha^z + (1-f^z)(1-\alpha^z)]\}$$

where $\Delta(\alpha^z, z) \equiv \lambda(\alpha^z, z, z) - \lambda(\alpha^z, S, z)$. Thus, the governing party will choose policy $z \in \{A, B\}$ if and only if $\psi(\alpha^z, z) \geqq 0$.

The governing party's strategy (18) is a best response if and only if $\psi(\alpha^z, z) \leq 0 \,\forall \alpha^z \in [0, \alpha^{z*})$ and if and only if $\psi(\alpha^z, z) > 0 \,\forall \alpha^z \in [\alpha^{z*}, 1]$. Since $\Delta(\alpha^z, z)$ is increasing in α^z and continuous, $\psi(\alpha^z, z)$ is increasing in α^z and continuous. The strategy (18) is then a best response if and only if $\psi(\alpha^{z*}, z) = 0$. There exists $\alpha^{z*} \in (0, 1)$ if and only if $\psi(0, z) < 0 < \psi(1, z)$.

$$\psi(0, z) = -1 + \delta\Delta(0, z)(k + f^z) < 0$$

if $\delta\Delta(0, z)(k + f^z) < 1$.

If $\Delta(0, z) \leq 0$, $\psi(0, z) < 0$. If $\Delta(0, z) > 0$, $\psi(0, z) < 0$ if $k < [1/\delta\Delta(0, z)] - f^z$.

$$\psi(1, z) = 1 + \delta\Delta(1, z)(1 + k - f^z) > 0$$

if $\delta\Delta(1, z)(1 + k - f^z) > -1$.

If $\delta\Delta(1, z) \geq 0$, $\psi(1, z) > 0$ since $1 + k - f^z > 0$. If $\delta\Delta(1, z) < 0$, $\psi(1, z) > 0$ if $k < 1/\delta\Delta(1, z) - (1 - f^z)$.

Thus, $\psi(0) < 0 < \psi(1)$ if $k < \bar{k} = \max\{[1/\delta\Delta(0, z)] - f^z, [1/\delta\Delta(1, z)] - (1 - f^z)\}$

Q. E. D.

Since $\Delta(\alpha^z, z) \equiv \lambda(\alpha^z, z, z) - \lambda(\alpha^z, S, z)$, k is most likely less than $\bar{k}$.

4. 2. The Ministry's Equilibrium Strategy

Using the results developed for voting behavior and for the governing party's strategy choice, it is now possible to show conditions under which various interesting equilibria can occur or, in some situations, must occur. Recall that the strategy is a function of its type β, but is also dependent upon the distributions G^A, G^B, F^A, and F^B, because these functions affect the values of $E[U|\beta, A]$ and $E\{U|\beta, B]$. In particular, the ministry chooses A when $\xi(\beta) = E[U|\beta, A] - E[U|\beta, B] \geq 0$ and B otherwise. We may write out ξ in detail as:

$$\begin{aligned}
\xi(\beta) = {} & (2\beta - 1)\eta_1(A) + (1-\beta)(1+\delta) \\
& + (2\beta - 1)\delta\{\eta_1(A)\lambda^m(\beta, A, A)[\eta_2(A|A, A) - f^A] \\
& + [1 - \eta_1(A)]\lambda^m(\beta, S, A)[1 - f^A - \eta_2(S|A, S)] + f^A\} \\
& - (\beta - 1/2)\eta_1(B) - (1-\beta)(1+\delta) \\
& - (\beta - 1/2)\delta\{\eta_1(B)\lambda^m(\beta, B, B)[\eta_2(B|B, B) - f^B]
\end{aligned}$$

$$+[1-\eta_1(B)]\lambda^m(\beta,\ S,\ B)[1-f^B-\eta_2(S|B,\ S)]+f^B\}$$
$$=(2\beta-1)\eta_1(A)-(\beta-1/2)\eta_1(B)+(2\beta-1)\delta(f^A-f^B/2)$$
$$+(2\beta-1)\delta\{\eta_1(A)\lambda^m(\beta,\ A,\ A)([1-F^z(\max\{1/2,\ \alpha^{A*}\})]/\eta_1(A)-f^A)$$
$$+[1-\eta_1(A)]\lambda^m(\beta,\ S,\ A)(1-f^A-\{F^z(\min\{1/2,\ \alpha^{A*}\})/[1-\eta_1(A)]\})\}$$
$$-(\beta-1/2)\delta\{\eta_1(B)\lambda^m(\beta,\ B,\ B)([1-F^z(\max\{1/2,\ \alpha^{B*}\})]/\eta_1(B)-f^B)$$
$$+[1-\eta_1(B)]\lambda^m(\beta,\ S,\ B)(1-f^B-\{F(\min\{1/2,\ \alpha^{B*}\})/[1-\eta_1(B)]\})\},$$

where

$\lambda^m(\beta,\ x,\ z)$: a type-β ministry's subjective probability that the governing party wins the election when it chooses policy $x\in\{z,\ S\}$ and when the ministry's proposal is $z\in\{A,\ B\}$,

f^z : a type-β ministry's subjective probability that the opposition party chooses policy $z\in\{A,\ B\}$, $f^z=1-F^z(1/2)$.

$F^z(\cdot)$: $[0,\ 1]\to[0,\ 1]$, the continuous cumulative distribution function from which the governing party's type is randomly drawn.

$1-F^z(\alpha^{z*})$: the ministry's subjective probability that a type-α^z governing party chooses policy $z\in\{A,\ B\}$ at period 1,

α^{z*}: the ministry's expectation of α^{z*},

$\eta_1(z)=1-F^z(\alpha^{z*})$,

$$\eta_2(z|z,\ z)=[1-F^z(\max\{1/2,\ \alpha^{z*}\})]/\eta_1(z),$$
$$\eta_2(S|z,\ S)=F^z(\min\{1/2,\ \alpha^{z*}\})]/[1-\eta_1(z)].$$

In evaluating $\xi(\beta)$ it helps to distinguish among four cases. These are 1) $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}\geq 1/2$, 2) $\alpha^{A*}<1/2$ and $\alpha^{B*}<1/2$, 3) $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}<1/2$, and 4) $\alpha^{A*}<1/2$ and $\alpha^{B*}\geq 1/2$. Before looking into the four cases, it is useful to know when $\alpha^{A*}\leq\alpha^{B*}$ and when $\alpha^{A*}>\alpha^{B*}$. Since the relative value between α^{A*} and α^{B*} is apparent in Cases 3 and 4, we have to check only the other two cases.

Results in each of these cases can be obtained for the special situation of the G^z and F^z being related by first order stochastic dominance. For this reason we briefly review this concept. Then, Proposition 1 states conditions under which we must have $\alpha^{A*}\leq\alpha^{B*}$. This relationship is used in the proof of some later propositions. Following that are Propositions 2-5 in which specific cases are examined. Proposition 2 takes up the case of $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}\geq 1/2$. This further divides into the subspace of (a) G^A dominates G^B and F^A dominates F^B and (b) the converse. In (a) it is shown that $\xi(\beta)\geq 0$. In (b) it is shown that there exists some G^A, G^B, F^A, and F^B such that $\xi(\beta)<0$ for some admissible values of β.

Proposition 3 takes up the case of $\alpha^{A*}<1/2$ and $\alpha^{B*}<1/2$. This further divides into the subspace of (a) G^A dominates G^B and F^A dominates F^B and (b) the converse. In (a) it is shown that $\xi(\beta)\geq 0$. In (b) it is shown that there exists some G^A, G^B, F^A, and F^B such that $\xi(\beta)<0$ for some admissible values of β.

Proposition 4 takes up the case of $\alpha^{A*} \geq 1/2$ and $\alpha^{B*} < 1/2$. This further divides into the subspace of (a) F^A dominates F^B and $F^B(a^{B*}) > F^A(\alpha^{A*})$ and (b) F^B dominates F^A. In (a) it is shown that there exists F^A, and F^B such that $\xi(\beta) \geq 0$ for some β. In (b) it is shown that there exists some F^A, and F^B such that $\xi(\beta) < 0$ for some admissible values of β and $\xi(\beta) \geq 0$ for some other admissible values.

Finally, Proposition 5 takes up the case of $\alpha^{A*} < 1/2$ and $\alpha^{B*} \geq 1/2$. This further divides into the subspace of (a) F^A dominates F^B and $F^B(a^{B*}) > F^A(a^{A*})$ and (b) F^B dominates F^A. In (a) it is shown that there exists F^A, and F^B such that $\xi(\beta) \geq 0$ for some β. In (b) it is shown that there exists some F^A, and F^B such that $\xi(\beta) < 0$ for some admissible values of β.

Before presenting the first proposition we need to remember that the distribution function $G^A(\mu)$ stochastically dominates $G^B(\mu)$ in the first degree, if and only if $G^A(\mu) \leq G^B(\mu)\ \forall \mu$ (see Figure 2). Voters' type μ is distributed more in the side of $\mu > 1/2$ when $G^z(\mu) = G^A(\mu)$ than when $G^z(\mu) = G^B(\mu)$. Thus, more voters like policy A than policy B.

PROPOSITION 1: Suppose (1) either α^{A*}, $\alpha^{B*} \geq 1/2$ or α^{A*}, $\alpha^{B*} < 1/2$, (2) $G^A(\cdot)$, the distribution function representing the median voter's type when $z = A$, stochastically dominates $G^B(\cdot)$ in the first degree, and (3) $F^A(\cdot)$, the distribution function representing the governing party's type when $z = A$, stochastically dominates $F^B(\cdot)$ in the first degree. Then, $\alpha^{A*} \leq \alpha^{B*}$.

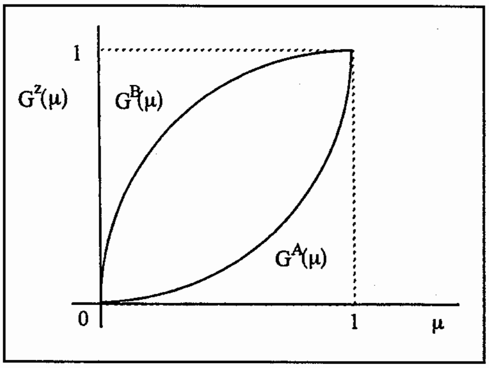

Figure 2. Stochastical Dominance

This proposition means that when both policy proposals are popular (i.e., the hurdles for the governing party to accepts the ministry's proposals, α^{A*}, $\alpha^{B*} < 1/2$) or not popular (i.e., α^{A*}, $\alpha^{B*} \geq 1/2$) among voters, if proposal A is relatively more popular than proposal B among voters (i.e., $G^A(\cdot) \leq G^B(\cdot)$) and more favored by the governing party (i.e., $F^A(\cdot) \leq F^B(\cdot)$), then, the governing party is more likely to accept proposal A than proposal B.

PROOF

Let us first assume $\alpha^{z*} \geq 1/2$. Then,

$$\begin{aligned}\psi(\alpha^{z*}, z) &= 2\alpha^{z}-1+\delta\Delta(\alpha^{z}, z)\{[\max\{\alpha^{z}, 1-\alpha^{z}\}+k] \\ &\qquad -[f^{z}\alpha^{z}+(1-f^{z})(1-\alpha^{z})]\} \\ &= 2\alpha^{z*}-1+\delta\Delta(\alpha^{z*}, z)[(1-f^{z})(2\alpha^{z*}-1)+k] \\ &= 0,\end{aligned}$$

where α^{z*} is the solution to $\psi(\alpha^{z}, z)=0$. Since $\alpha^{z*} \geq 1/2$,

$$\begin{aligned}\Delta(\alpha^{z*}, z) &= -(2\alpha^{z*}-1)/\delta[(1-f^{z})(2\alpha^{z*}-1)+k] \\ &= -1/\delta[F^{z}(1/2)+k/(2\alpha^{z*}-1)] \leq 0.\end{aligned}$$

Since

$$\begin{aligned}\Delta(\alpha^{z*}, z) &= \lambda(\alpha^{z*}, z, z)-\lambda(\alpha^{z*}, S, z) \\ &= \int_0^1\{1-H([2/\rho][1/2-\mu^{z}]+\mu^{z}-\alpha^{z*})\}G^{z\prime}(\mu^{z})d\mu^{z} \\ &\quad -\int_0^1\{1-H(-[2/\rho][1/2-\mu^{z}]-\mu^{z}+\alpha^{z*})\}G^{z\prime}(\mu^{z})d\mu^{z},\end{aligned}$$

$\Delta(\alpha^{z*}, z)=0$ if $\alpha^{z*}=1/2$ and $G^{z\prime}(\mu^{z})$ is symmetric around $\mu^{z}=1/2$. Since $\Delta(\alpha^{z*}, z)$ is an increasing function of α^{z} and $\alpha^{z*} \geq 1/2$, if $\Delta(\alpha^{z*}, z)<0$, $G^{z}(\mu^{z})$ must be sufficiently skewed to the left of $\mu^{z}=1/2$.

If $\alpha^{z*}<1/2$,

$$\begin{aligned}\psi(\alpha^{z*}, z) &= 2\alpha^{z*}-1+\delta\Delta(\alpha^{z*}, z)[-f^{z}(2\alpha^{z*}-1)+k] \\ &= (2\alpha^{z*}-1)[1-\delta\Delta(\alpha^{z*}, z)f^{z}]+\delta\Delta(\alpha^{z*}, z)k \\ &= 0.\end{aligned}$$

Since $\alpha^{z*}<1/2$, $\Delta(\alpha^{z*}, z)>0$. Then, $G^{z\prime}(\mu^{z})$ must be sufficiently skewed to the right of $\mu^{A}=1/2$.

Let us now compare α^{A*} with α^{B*}. Since $\psi(\alpha^{z}, z)$ is an increasing function of α^{z}, if $\psi(\alpha^{A*}, A)-\psi(\alpha^{A*}, B)=-\psi(\alpha^{A*}, B)\geq 0$, $\alpha^{A*}\leq\alpha^{B*}$ and if $\psi(\alpha^{A*}, A)-\psi(\alpha^{A*}, B)=-\psi(\alpha^{A*}, B)<0$, $\alpha^{A*}>\alpha^{B*}$.

If α^{A*}, $\alpha^{B*}\geq 1/2$ (Case 1),

$$\begin{aligned}&\psi(\alpha^{A*}, A)-\psi(\alpha^{A*}, B) \\ &= \delta\{(2\alpha^{A*}-1)[(1-f^{A})\Delta(\alpha^{A*}, A)-(1-f^{B})\Delta(\alpha^{A*}, B)] \\ &\qquad +k[\Delta(\alpha^{A*}, A)-\Delta(\alpha^{A*}, B)]\} \\ &= \delta\{(2\alpha^{A*}-1)[F^{A}(1/2)\Delta(\alpha^{A*}, A)-F^{B}(1/2)\Delta(\alpha^{A*}, B)] \\ &\qquad +k[\Delta(\alpha^{A*}, A)-\Delta(\alpha^{A*}, B)]\}.\end{aligned}$$

Since α^{A*}, $\alpha^{B*}\geq 1/2$, $\Delta(\alpha^{A*}, A)$, $\Delta(\alpha^{B*}, B)\leq 0$. If $G^{A}(\cdot)$ stochastically dominates $G^{B}(\cdot)$ in the first degree, $0\geq\Delta(\alpha^{A*}, A)\geq\Delta(\alpha^{A*}, B)$. If $F^{A}(\cdot)$ stochastically dominates $F^{B}(\cdot)$ in the first degree, $0 \leq F^{A}(1/2) \leq F^{B}(1/2)$, thus, $F^{A}(1/2)\Delta(\alpha^{A*}, A) \geq F^{B}(1/2)\Delta(\alpha^{A*}, B)$. Therefore, $\psi(\alpha^{A*}, A)\geq\psi(\alpha^{A*}, B)$, i.e., $\alpha^{A*}\leq\alpha^{B*}$. If, instead, $G^{B}(\cdot)$ stochastically dominates $G^{A}(\cdot)$ in the first degree, it is possible that $\Delta(\alpha^{A*}, A)<\Delta(\alpha^{A*}, B)\leq 0$. Then, if $F^{B}(\cdot)$ stochastically dominates $F^{A}(\cdot)$ in the first degree, $F^{A}(1/2)\Delta(\alpha^{A*}, A)<F^{B}(1/2)\Delta(\alpha^{A}, B)$ can be possible. In that case, $\psi(\alpha^{A*}, A)<\psi(\alpha^{A*}, B)$, i.e., $\alpha^{A*}>\alpha^{B*}$.

If α^{A*}, $\alpha^{B*}<1/2$ (Case 2),

$$\psi(\alpha^{A*}, A)-\psi(\alpha^{A*}, B)$$
$$=\delta\{(2\alpha^{A*}-1)[-f^{A}\Delta(\alpha^{A*}, A)-(-f^{B})\Delta(\alpha^{A*}, B)]+k[\Delta(\alpha^{A*}, A)-\Delta(\alpha^{A*}, B)]\}$$
$$=\delta\{(2\alpha^{A*}-1)[(1-F^{B}(1/2))\Delta(\alpha^{A*}, B)-(1-F^{A}(1/2))\Delta(\alpha^{A*}, A)]$$
$$+k[\Delta(\alpha^{A*}, A)-\Delta(\alpha^{A*}, B)]\}.$$

If $G^{A}(\cdot)$ stochastically dominates $G^{B}(\cdot)$ in the first degree, $\Delta(\alpha^{A*}, A)\geq\Delta(\alpha^{A*}, B)\geq 0$. If $F^{A}(\cdot)$ stochastically dominates $F^{B}(\cdot)$ in the first degree, $1-F^{A}(1/2)\geq 1-F^{B}(1/2)$. Then, since $\alpha^{A*}<1/2$, $(2\alpha^{A*}-1)[(1-F^{B}(1/2))\Delta(\alpha^{A*}, B)-(1-F^{A}(1/2))\Delta(\alpha^{A*}, A)]\geq 0$. Thus, $\psi(\alpha^{A*}, A)\geq\psi(\alpha^{A*}, B)$, i.e., $\alpha^{A*}\leq\alpha^{B*}$. If, instead, $G^{B}(\cdot)$ stochastically dominates $G^{A}(\cdot)$ in the first degree, it is possible that $0<\Delta(\alpha^{A*}, A)<\Delta(\alpha^{A*}, B)$. If that is the case, if $F^{B}(\cdot)$ stochastically dominates $F^{A}(\cdot)$ in the first degree, $1-F^{B}(1/2)\Delta(\alpha^{A*}, B)>1-F^{A}(1/2)\Delta(\alpha^{A*}, A)$. Therefore, $\psi(\alpha^{A*}, A)<\psi(\alpha^{A*}, B)$, i.e., $\alpha^{A*}>\alpha^{B*}$.
Q. E. D.

Now, we can examine each case.
(Case 1) $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}\geq 1/2$

PROPOSITION 2: If $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}\geq 1/2$, then, (a) If $G^{A}(\cdot)$ stochastically dominates $G^{B}(\cdot)$ in the first degree and $F^{A}(\cdot)$ stochastically dominates $F^{B}(\cdot)$ in the first degree (i.e., $\alpha^{A*}\leq\alpha^{B*}$), $\xi(\beta)\geq 0$. (b) If $G^{B}(\cdot)$ stochastically dominates $G^{A}(\cdot)$ in the first degree and $F^{B}(\cdot)$ stochastically dominates $F^{A}(\cdot)$ in the first degree (i.e., $\alpha^{A*}>\alpha^{B*}$), there exists some G^{A}, G^{B}, F^{A}, and F^{B} such that $\xi(\beta)<0$ for some admissible values of β.

Remember that the ministry prefers proposal A to B. This proposition says that when both proposals are not popular among voters, if both voters and the governing party prefer A to B, the ministry always gets higher utility from proposing A than proposing B. However, if both voters and the governing party prefer B to A, the ministry could get higher utility from proposing B than proposing A.

PROOF

$$\xi(\beta)=(2\beta-1)\eta_1(A)-(\beta-1/2)\eta_1(B)+(2\beta-1)\delta(f^{A}-f^{B}/2)$$
$$+(2\beta-1)\delta\{\eta_1(A)\lambda^{m}(\beta, A, A)([1-F^{A}(\alpha^{A*})]/\eta_1(A)-f^{A})$$
$$+[1-\eta_1(A)]\lambda^{m}(\beta, S, A)(1-f^{A}-\{F(1/2)/[1-\eta_1(A)]\})\}$$
$$-(\beta-1/2)\delta\{\eta_1(B)\lambda^{m}(\beta, B, B)([1-F^{B}(\alpha^{B*})]/\eta_1(B)-f^{B})$$
$$+[1-\eta_1(B)]\lambda^{m}(\beta, S, B)(1-f^{B}-\{F^{B}(1/2)/[1-\eta_1(B)]\})\}$$
$$=(2\beta-1)\{[1-F^{A}(\alpha^{A*})]-(1/2)[1-F^{B}(\alpha^{B*})]$$
$$+\delta[1/2-F^{A}(1/2)+(1/2)F^{B}(1/2)]\}$$
$$+(2\beta-1)\delta F^{A}(1/2)[1-F^{A}(\alpha^{A*})]\Delta(\beta^{A}, A)$$
$$-(1/2)(2\beta-1)\delta F^{B}(1/2)[1-F^{B}(\alpha^{B*})]\Delta(\beta^{B}, B)$$

where $\Delta(\beta^{A}, A)=\lambda^{m}(\beta, A, A)-\lambda^{m}(\beta, S, A)$ and $\Delta(\beta^{B}, B)=\lambda^{m}(\beta, B, B)-\lambda^{m}(\beta, S, B)$.

Since $\alpha^{A*} \geq 1/2$ and $\alpha^{B*} \geq 1/2$, both $\alpha^{A*} \leq \alpha^{B*}$ and $\alpha^{A*} > \alpha^{B*}$ are possible.

(i) $\alpha^{A*} \leq \alpha^{B*}$

Since $\beta \geq 1/2$, $\xi(\beta) \geq (<) 0$ if

$$\begin{aligned}\xi(\beta)/(2\beta\text{-}1) = &[1-F^A(\alpha^{A*})][1+\delta F^A(1/2)\Delta(\beta^A, A)]\\ &-(1/2)[1-F^B(\alpha^{B*})][1+\delta F^B(1/2)\Delta(\beta^B, B)]\\ &+\delta\{(1/2)[1-F^A(1/2)]+(1/2)[F^B(1/2)-F^A(1/2)]\}\\ &\geq (<) 0.\end{aligned}$$

As shown above, if $G^A(\cdot)$ stochastically dominates $G^B(\cdot)$ in the first degree and if $F^A(\cdot)$ stochastically dominates $F^B(\cdot)$ in the first degree, $\alpha^{A*} \leq \alpha^{B*}$. In other words, if the ministry thinks that both voters and the governing party prefer proposal A to B, $\alpha^{A*} \leq \alpha^{B*}$. Then, $F^A(\alpha^{A*}) \leq F^A(\alpha^{B*}) \leq F^B(\alpha^{B*})$, thus,

$$1-F^A(\alpha^{A*}) \geq 1\text{-}F^B(\alpha^{B*}).$$

Also, $1/2-F^A(1/2)+(1/2)F^B(1/2)=(1/2)[1-F^A(1/2)]+(1/2)[F^B(1/2)-F^A(1/2)]>0$. Moreover, since $\beta^A=\beta>1/2=\beta^B$ and $\Delta(\beta^z, z)$ is an increasing function of β^z, $\Delta(\beta^A, z) \geq \Delta(\beta^B, z)$. Since $\alpha^{B*} \geq 1/2$ and $\Delta(\alpha^{B*}, B)<0$, $\Delta(\beta^B, B)<0$. Since $G^A(\cdot)$ stochastically dominates $G^B(\cdot)$ in the first degree, $\Delta(\beta^A, A) \geq \Delta(\beta^A, B) \geq \Delta(\beta^B, B)$. Also, since $F^A(\cdot)$ stochastically dominates $F^B(\cdot)$ in the first degree, $0 \leq F^A(1/2) \leq F^B(1/2)$. Hence,

$$F^A(1/2)\Delta(\beta^A, A) \geq F^B(1/2)\Delta(\beta^B, B).$$

Therefore, if $G^A(\cdot)$ stochastically dominates $G^B(\cdot)$ in the first degree and if $F^A(\cdot)$ stochastically dominates $F^B(\cdot)$, $\xi(\beta) \geq 0$. In other words, when the ministry thinks that both voters and the governing party like the proposal A better than B, it chooses proposal A.

(ii) $\alpha^{A*} > \alpha^{B*}$

As shown above, if $G^B(\cdot)$ stochastically dominates $G^A(\cdot)$ in the first degree and if $F^B(\cdot)$ stochastically dominates $F^A(\cdot)$ in the first degree, it is possible that $\alpha^{A*} > \alpha^{B*}$. In other words, if the ministry thinks that both voters and the governing party prefer proposal B to A, $\alpha^{A*} > \alpha^{B*}$. Then, $F^A(\alpha^{A*}) > F^A(\alpha^{B*}) > F^B(\alpha^{B*})$, thus,

$$1-F^A(\alpha^{A*}) < 1-F^B(\alpha^{B*}).$$

Also, if $F^B(\cdot)$ stochastically dominates $F^A(\cdot)$ in the first degree,

$$F^A(1/2) > F^B(1/2).$$

Let $\zeta(A)=1+\delta F^A(1/2)\Delta(\beta^A, A)$ and $\zeta(B)=1+\delta F^B(1/2)\Delta(\beta^B, B)$.

Then $\xi(\beta)<0$ if

$$\text{(20)} \quad \begin{aligned}[1-F^A(\alpha^{A*})]\zeta(A) < &(1/2)[1-F^B(\alpha^{B*})]\zeta(B)\\ &-\delta\{(1/2)[1-F^A(1/2)]+(1/2)[F^B(1/2)-F^A(1/2)]\}.\end{aligned}$$

Since $1>F^z(\alpha^{z*})>0$ for all $z=A, B$, $F^A(\alpha^{A*})>F^B(\alpha^{B*})$, and $F^A(1/2)>F^B(1/2)$, suppose $F^A(\alpha^{A*})=.9$, $F^B(\alpha^{B*})=.3$, $F^A(1/2)=.6$, and $F^B(1/2)=.1$. Thus,

$$\zeta(A)=1+.6\delta\Delta(\beta^A, A) \text{ and } \zeta(B)=1+.1\delta\Delta(\beta^B, B).$$

Then, (20) becomes

$$.1+.06\delta\Delta(\beta^A, A)<.35+.035\delta\Delta(\beta^B, B)-\delta[.2-.25].$$

Since $0<\delta<1$, $-1<\Delta(\beta^A, A)<1$ and $-1<\Delta(\beta^B, B)<0$,

$$-.25+.06\delta\Delta(\beta^A, A)<-.19<.015<.05\delta+.035\delta\Delta(\beta^B, B).$$

Hence, (20) holds. Therefore, when the ministry thinks that the hurdles for the governing party to accepts the ministry's proposals are higher than or equal to 1/2 but voters like the proposal B better than A, and that the party likes proposal B better than proposal A, even if the ministry likes proposal A better, it may choose proposal B. *Q. E. D.*

(Case 2) $\alpha^{A*}<1/2$ and $\alpha^{B*}<1/2$

PROPOSITION 3: If $\alpha^{A*}<1/2$ and $\alpha^{B*}<1/2$ (i.e., the hurdles for the governing party to accepts the ministry's proposals are less than 1/2), then, (i) if $G^A(\cdot)$ stochastically dominates $G^B(\cdot)$ in the first degree and if $F^A(\cdot)$ stochastically dominates $F^B(\cdot)$, $\xi(\beta)\geqq 0$. (ii) If $G^B(\cdot)$ stochastically dominates $G^A(\cdot)$ in the first degree and if $F^B(\cdot)$ stochastically dominates $F^A(\cdot)$ in the first degree, there exists some G^A, G^B, F^A, and F^B such that $\xi(\beta)<0$ for some admissible values of β.
(The proof is available from the author upon request.)

This proposition says that when both proposals are popular among voters, if both voters and the governing party prefer A to B, the ministry always gets higher utility from proposing A than proposing B. However, if both voters and the governing party prefer B to A, the ministry could get higher utility from proposing B than proposing A.

(Case 3) $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}<1/2$

PROPOSITION 4: If $\alpha^{A*}\geq 1/2$ and $\alpha^{B*}<1/2$ (i.e., voters prefers B to A), then, (a) if $F^A(\cdot)$ stochastically dominates $F^B(\cdot)$ in the first degree and if $1-F^B(\alpha^{B*})<1-F^A(\alpha^{A*})$, there exists F^A, and F^B such that $\xi(\beta)\geq 0$ for some β. (b) If $F^B(\cdot)$ stochastically dominates $F^A(\cdot)$ in the first degree, there exists some F^A, and F^B such that $\xi(\beta)<0$ for some admissible values of β and $\xi(\beta)\geq 0$ for some other admissible values. (The proof is available from the author upon request.)

This proposition says that when the voters prefer proposal B to A, if the governing party prefers A to B, and if the ministry believes the probability that the governing party accepts proposal B is less than proposal A (in spite of A's less popularity among voters), the ministry could get higher utility from proposing A than proposing B. However, if the governing party prefers B to A, the ministry could get higher utility from proposing B than proposing A.

(Case 4) $\alpha^{A*}<1/2$ and $\alpha^{B*}\geq 1/2$

PROPOSITION 5: If $\alpha^{A*}<1/2$ and $\alpha^{B*}\geq 1/2$ (i.e., voters prefer A to B), then, (a) if $F^A(\cdot)$ stochastically dominates $F^B(\cdot)$ in the first degree and if $1-F^B(\alpha^{B*})<1-F^A(\alpha^{A*})$, there exists F^A, and F^B such that $\xi(\beta)\geq 0$ for some β. (b) If $F^B(\cdot)$ stochastically dom-

inates $F^A(\cdot)$ in the first degree, there exists some F^A, and F^B such that $\xi(\beta)<0$ for some admissible values of β.
(The proof is available from the author upon request.)

This proposition says that when the voters prefer proposal A to B, if the governing party prefers A to B and if the ministry believes the probability that the governing party accepts proposal B is less than proposal A, the ministry always gets higher utility from proposing A than proposing B. However, if the governing party prefers B to A, the ministry could get higher utility from proposing B than proposing A.

5. Concluding Remarks

This paper demonstrates the following possibilities:

- Even if both voters and the governing party prefer proposal B, the ministry may propose its preferred proposal A. The tax policy by the Ministry of Finance (MOF) is a good example. The ministry has been always pursuing a balanced budget, and tends to propose some kind of tax increase regardless of the political environment of the times.
- If either voters or the governing party strongly prefers proposal B, the ministry may propose its less preferred proposal B. Having said the above comment about the MOF's tax policy, it reluctantly makes a tax proposal with some loopholes in order to get enough support for its successful legislation.

However, in reality voters and politicians do not have any interest in most policies. Unless it is a big public issue, a particular policy only interests the ministry that drafts the policy, the industries affected by the policy, and politicians whose constituencies are affected by the policy. These three groups often share the same interest. Therefore, we should not stress the influence of ordinary voters too much.

As for the implication for the Japanese policymaking process, if politicians have veto power over the bureaucrats' proposals, Japanese voters can indirectly influence the policymaking process controlled by the elite bureaucrats by voting. However, in reality, this route of influence is used by special interest groups. This is consistent with the model in this paper if one makes the reasonable assumption that the median voter belongs to a special interest group. Special interest groups often control the deciding votes, especially in the Japanese multi-member district system in the former election system.

In the next stage of my research, I will investigate the other side of the coin, i.e., the ministry's influence on the electoral outcome. Since the LDP is no longer the only party realistically capable of governing, it is now worth examined the possibility that the ministry strategically makes a proposal that impedes the electoral success of their less preferred governing party.

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