working paper

9802

Appointing the Median Voter of a Policy Board

by Christopher J. Waller

FEDERAL RESERVE BANK OF CLEVELAND

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Christopher J. Waller is a professor of economics at Indiana University. The author owes a tremendous debt to Robert Dittmar for doing the computer programming associated with this project. He also wishes to thank Steven Stohs, Washington University, and the Federal Reserve Banks of St. Louis and Cleveland for research support on this project. For their helpful comments on earlier drafts of this paper, the author thanks Juergen von Hagen, Roy Gardner, Roberto Perotti, and Michael Salemi. Finally, He would like to thank Olivier Blanchard and an anonymous referee for their valuable suggestions for revising the paper

January 1998

Abstract

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APPOINTING THE MEDIAN VOTER OF A POLICY BOARD*

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I. INTRODUCTION

In a world characterized by partisan politics and electoral uncertainty, Alesina [1987] showed that the economy would experience partisan business cycles. The implication is that elections create monetary and fiscal policy uncertainty, which hinders private decision-making and lowers social welfare. Since abolishing elections is not an option, a critical question for democratic societies is how to design the policy-making environment to overcome electoral uncertainty and minimize partisanship without ignoring the desires of the electorate? Alternatively, how can society make the policy-maker independent of the electorate's preferences yet maintain politically accountability? The purpose of this paper is to show that one institutional design -- an independent policy board -- works quite well for reducing policy uncertainty while still allowing recent electoral outcomes to have an influence over the course of policy.

Three simple ways of reducing electoral/policy uncertainty are: 1) resort to a policy rule with constitutional status, 2) force the parties to compromise in the setting of policy no matter who wins the election, 3) delegate the setting of policy to a non-elected, 'independent' policy authority.[1] A constitutional rule will greatly reduce, if not eliminate, policy uncertainty, but it essentially ignores the current electorate's policy preferences. While this may be a desirable course of action for some policy decisions, such as basic human rights, it tends to be undemocratic with regards to other policy actions, such as fiscal and monetary policy. Furthermore, policy rules eliminate discretion and thus the ability to respond to current events, such as the outcomes of recent elections.

1. Work by Alesina and Gatti [1995], Waller [1995] and Waller and Walsh [1996] has shown that delegating monetary policy to a non-elected central banker can substantially reduce policy uncertainty. However, certainty is gained by having the central bankers essentially behave like a benevolent dictator.

With regards to bi-partisan cooperation, Alesina [1987, 1988] showed that policy uncertainty would be reduced if the parties set policy in a cooperative fashion or resorted to reputation-building in a non-cooperative policy setting environment. But this early research begged the more practical question of how to design political institutions to ensure policy compromise.

More recently, Alesina and Rosenthal [1995, 1996] have developed a theory of divided government as a method for reducing policy uncertainty. In the early versions of the Alesina [1987] model the party that wins the election for the executive office sets policy to maximize its own self-interest (winner-take-all). In contrast, Alesina and Rosenthal focus on the interaction of the executive and legislative branches in the setting of policy. In particular, they look at how 'divided' government can lead to policy moderation. Alesina and Rosenthal *assume* that policy is the outcome of some unspecified bargaining process but it can be expressed as a weighted average of the preferred policies of the party holding the executive office and the strength of the opposition party in the legislature. The issue they study is how rational voters cast their ballots in the executive and legislative elections taking into account this ad-hoc policy rule.[2] Alesina and Rosenthal show that voters will choose to engage in 'split-ticket' voting in order to create divided government and ensure policy compromise. As a result, policy is more certain and political risk is lowered. However, policy still exhibits a partisan flavor depending on which party controls the executive branch (winner-takes-most). The main conclusion is that in a world of divided government, policy variability is reduced relative to the winner-take-all model but is not completely eliminated.

2. In short, they treat the bargaining outcome over policy as an exogenously determined process and then endogenously determine the voting outcome.

Assuming that the executive and legislative branches bargain directly over the setting of policy is reasonable for many types of policy decisions. However with other decisions, particularly monetary policy, society has opted for an alternative policy-making institution -- a policy board. Under this system, the executive and legislative branches delegate the policy decision to an independent but politically appointed 'board' whose members serve finite but overlapping terms of office.[3] Central banks -- such as the Federal Reserve, the Bundesbank, the proposed ECB, and the newly designed Bank of England -- have similar structures.[4] With a policy board, the compromise between the two parties now involves bargaining over the appointees to the board rather than direct bargaining over policy. The key question is whether or not this policy-setting institution reduces policy uncertainty.[5] In other words, does the appointment process make policy more or less partisan?

If policy is delegated to a policy board, how are board members selected? In the United States, a common practice for appointing board members at the Federal level is for the President to nominate a candidate who must be confirmed by the Senate. If the nominee is confirmed, she takes a seat on the board. If the nominee is rejected, a new nominee is offered up and the process repeats itself. Waller [1992] has argued that this nomination-confirmation process is similar to a Rubinstein [1982] non-cooperative bargaining problem and analyzed the appointment of individuals to a policy board. However, the results of that model are best interpreted as a model as a one-member board who sets policy unilaterally. The issue then is the appropriate timing of

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3. Tabellini [1987], Cothren [1988], Waller [1989], Lohmann [1995], Garcia de Paso [1995], Faust [1996] and Bullard, Schaling and Waller [1997] examine the effects of delegating policy to a policy board on a wide range of issues. However, none of those models explicitly model the appointment process or do so in a very naïve manner.

4. Other non-monetary policy examples of policy boards are the U.S. Supreme Court and the National Labor Relations Board.

5. Cukierman and Meltzer (1986) for example motivate uncertainty regarding the future course of monetary policy as arising from turnover on the FOMC. Svensson (1995) gives a very interesting account of how the Swedish Riksbank's appointment structure creates monetary uncertainty rather than resolving it.

the board member's appointment relative to the next election. The issue of who will be appointed when policy is made by group decision has not been studied.[6]

The board's decision-making process is a key determinant of the dynamics of the appointment process and the setting of policy. If the board's policy action is the one preferred by the median voter on the board, then filling a vacancy determines today's median voter and policy action. Furthermore, filling a vacancy today also sets the boundaries for the course of future policy if the appointees serve more than one period. Thus, today's appointee affects both the current and future path of policy. Expectations of future policy are complicated by the fact that there is board turnover and elections make future nomination/confirmation roles uncertain. Consequently, today's choice of an acceptable board member requires solving for the dynamic path of appointments in a stochastic bargaining environment.

In this paper, Waller's [1992] two-party bargaining model of appointments is used to determine whether a policy board reduces or magnifies policy uncertainty.[7] In the benchmark model it is shown that a policy-board eliminates all policy uncertainty and, in the steady state, produces the same policy as would occur with a policy rule. What is surprising about this result is that it is obtained in a political environment in which parties are concerned only with their own self-interest, they bargain non-cooperatively and policy is set in a discretionary fashion. There is no bi-partisan cooperation or sacrifice of self-interest in the pursuit of the public interest. Yet policy is perfectly stable and predictable. In a sense, there is a political 'invisible hand' at work --

6. There is a developing empirical literature in political science that examines how appointments affect the direction of policy, see Snyder and Weingast [1994] and Chang [1997], but they do not examine who will be appointed given an initial set of incumbents on the board.

7. Technically, the appointment decision is modeled as a stochastic dynamic programming problem with the incumbents on the board representing the state variables and today's appointee being the control variable. Elections determine which party nominates and which confirms and are treated as a 'black box,' i.e., are modeled as an N-state Markov chain.

by setting up the rules of the game properly and then having the participants pursue their own self-interest, society achieves its optimal outcome.

An appealing feature of this result is it is achieved without ignoring the wishes of the current electorate. Political accountability occurs because the current electorate chooses the executive who can *potentially* nominate as partisan a central banker as desired, thereby giving the current majority what it wants. It is simply not in the executive's self-interest to do so; rather he will nominate someone for the board whose policy preferences are the same as everyone else on the board and so the previous policy course is maintained. Thus, the appointment process generates political accountability even though the board does not produce the policy desired by the current majority of voters.

Another nice implication of this result is that elections are 'good' for policy stability, not 'bad' as they are in the basic Alesina model. The reason is that one of the key assumptions for obtaining a perfectly stable policy is elections must occur frequently (relative to the length of board terms). Frequent elections strengthen the confirming party's bargaining position and thus help offset the nominating party's first-mover advantage in the bargaining game. Consequently, nominees must be closer to the middle in order to ensure confirmation. Hence, we get the paradoxical result that more electoral uncertainty reduces policy uncertainty.

The key institutional features that are responsible for the benchmark result are:

1. Frequent elections and/or long board terms.
2. Constant election probabilities (no incumbent bias or state dependency).
3. Parties have linear utility (risk neutrality).
4. Perpetually divided government.

In the latter part of the paper, the benchmark board model is amended to see how relaxing each of these assumptions affects the basic result. It is shown that relaxing any one of the assumptions breaks down the perfectly stable policy outcome. In general, however, even if assumptions 1) - 4) do not hold, policy is still more stable than in the Alesina [1987] and Alesina-Rosenthal [1996] models. Furthermore, it is also demonstrated that each of these problems can typically be overcome by lengthening board terms and/or expanding the board size.

While it is not surprising that breaking 1), 2) and 4) creates policy instability, the result that risk aversion leads to greater instability of policy is surprising. Such a result is counter Alesina's [1987] finding that risk aversion reduces policy variability. The reason for the conflicting results is that Alesina relies on cooperative bargaining (Nash) to determine the policy outcome, while non-cooperative bargaining (Rubinstein) is used here.

The remainder of the paper is organized as follows: In Section II, the political environment, the parties' policy preferences and the board structure are described. Section III contains models of policy without a board: Alesina's winner-take-all, Alesina and Rosenthal's winner-takes-most and a policy rule. In Section IV, the benchmark board model and its solution are presented. Section V presents the results when assumptions 1) - 4) are relaxed in the board model. Finally, Section VI contains concluding comments and directions of future research.

II. THE INSTITUTIONAL ENVIRONMENT

To study the appointment problem the following elements of the model need to be specified:

A. The political environment.
B. The parties' policy preferences.
C. The structure of the policy board and board members' policy preferences.
D. The set of acceptable candidates for the board
E. Time between elections and the parties' election probabilities.

A. The Political Environment

Following Waller [1992], society elects an executive (the President) to serve several administrative functions, including the nomination of members to a policy-making board. Voters choose the leader from one of two parties, party 0 and party 1. Elections are held every m periods where m will be assumed to equal 1 or 3 in the analysis that follows. Although the President nominates individuals to serve on the board, the legislative body (the Senate) must confirm nominations. Control of the confirming body is also determined by elections that occur simultaneously with the presidential election.[8] The probabilities associated with election outcomes are assumed to be independent of the policies followed by the board.[9] It is further assumed that there is complete party discipline across legislative bodies and within. This assumption is important for solving the model since it eliminates the need to determine intra-party negotiations and will be maintained throughout the paper. With regards to the nomination process, it is assumed that only one nomination *for a particular seat* can occur per period. In short, if a nominee for a seat is rejected, a new nominee for that particular seat cannot be offered up until the next period. However, multiple nominations for multiple vacancies are feasible in a given period. Finally, if an election occurs at the start of period t, then period t nominations occur immediately after the election.

An important aspect of the nomination-confirmation process is that it gives the nominating party a first-mover advantage. This may be a desirable feature in a democracy since society's attitude may be that the winner of the presidential election should have more influence

8. This is not a restrictive assumption and could be modified. Simultaneity of elections simplifies the model for obtaining analytical and numerical results. Confirmation is a by majority rule hence, unlike Alesina and Rosenthal, vote share beyond 50+ % is not relevant.

9. This assumption could be justified if one views voting as a multi-dimensional problem and voters cast their ballots based on other policy issues (abortion rights) than the board's policy (monetary growth rates).

in the policy process than the legislative branch since the president must win a national election whereas legislators do not. The issue is whether or not this first-mover advantage translates into partisan policy and policy uncertainty.

B. Party Objectives

Parties are assumed to derive utility from the policy chosen by the board. Let x_t be the policy set in period t with $x_t \in [0,1]$.[10] Each party wants to have policy chosen such that:

$$(1) \qquad V_{i,t}(I_t) = \max_{x_t}[u_i(x_t) + \beta E_t V_{i,t+1}(I_{t+1})] \qquad \text{for } i = 0,1$$

where $V_{i,t}(\cdot)$ is the value function for party i, I_t denotes the incumbents on the board at time t, β is the discount factor common to both parties and E_t denotes the expectations operator conditional on information available at time t.

The per-period utility from x_t is:

$$u_1(x_t) = u(x_t) \qquad u'_x > 0,\ u''_x \leq 0,\ u(0) = 0,\ u(1) < \infty$$

$$(2) \qquad u_0(x_t) = u(1 - x_t) \qquad u'_x < 0,\ u''_x \leq 0,\ u(0) = 0,\ u(1) < \infty$$

$$u_i(\varnothing) = 0 \qquad \textit{if no policy action is undertaken in t.}$$

From the utility functions, party 1's most preferred policy is $x_t = 1$ while party 0's most preferred policy is $x_t = 0$. It is assumed that if no policy action is enacted in period t, then no output is produced and the payoff to each party is zero. Alternative formulations of the model could

10. Policy can be thought of as inflation targets, attitudes towards regulation, business vs. labor interests, etc.

specify the status quo (last period's policy) as the policy output in period t if no action is undertaken.

Through the nomination and confirmation process, the parties choose individuals of type y_t in period t to fill vacancies that arise on the policy board. The individual's type reflects the policy action she would enact if she were allowed to set policy. It is assumed that $y_t \in [0,1]$. There is complete information regarding an individual's type and the individual's policy preferences are assumed to be temporally stable. Finally, once appointed, a board member cannot be removed.

C. The Structure of the Policy Board

It is assumed that there are 3 seats on the policy board and each seat has a 3 period term length. The model can actually be solved for a board of any size but the solution expressions for n > 3 board members are analytically unwieldy.[11] Hence, only a discussion of the case of n > 3 board members will be presented here. Board terms are assumed to be staggered and overlap by one period. Consequently, one vacancy arises every period from the expiration of a term. Vacancies arising for reasons other than rejection of a nominee (death, resignation, etc.) are ignored for analytical tractability.

The board sets policy according to the median voter rule. If every seat on the board is filled and the number of seats is odd, the median voter is easy to determine. In this case, $x_t = y_{mt}$ where y_{mt} denotes the preferred policy of the median board member in period t and $y_{m,t} \in [y_t, y_{t-1}, y_{t-2}]$. If vacancies are not filled for some reason in the current period, then the existing members of the board set policy. If two members are on the board, then it is assumed that the two members "split the difference" and x_t is a weighted average of their respective

11. Nevertheless, it can be simulated relatively easily.

policy positions with the parameter α being the weight attached to the most recently appointed incumbent's policy position.[12] Finally, if only one member is on the board, then that member determines policy unilaterally and sets x_t equal to her preferred policy. Thus, today's policy is a function of today's board composition, B_t, and can be written as $x_t = x_t(B_t)$. The assumption that policy is made by the median voter means that policy is set in a discretionary fashion -- whoever is on the board sets policy however they want.

The assumptions regarding the board structure and the determination of policy enable the parties' value functions to be written as:

(3) $$V_{i,t}(I_t) = \max_{y_t}[u_i(x_t(y_t \in B_t)) + \beta E_t V_{i,t+1}(y_t \in I_{t+1})] \qquad \text{for } i = 0,1.$$

D. Acceptable Candidates

Given the assumptions regarding the parties' preferences, the structure of the board and the setting of policy, we can determine the set of acceptable candidates. The choice of an individual today not only determines who the median voter is today but also influences who the median voter will be in the future. Thus, the choice is either to accept a candidate today and the policies associated with having that person on the board today and in the future, or to leave the seat open, have policy set by today's board members and wait to appoint an acceptable candidate tomorrow. Acceptable candidates for party i are those values of y_t that satisfy the following condition:

(4)
$$V_{i,t}(I_t) = \max_{y_t}[u_i(x_t(y_t \in B_t)) + \beta E_t V_{i,t+1}(y_t \in I_{t+1})] \geq u_i(x_t(y_t \notin B_t)) + \beta E_t V_{i,t+1}(y_t \notin I_{t+1})).$$

12. This eliminates the need to analyze intra-board bargaining when there are an even number of board members. von Hagen [1995] has studied intra-board bargaining but ignores appointment issues.

The left-hand side of the inequality in (4) is the value of having candidate y_t on today's board, $y_t \in B_t$, and having today's policy be influenced by y_t being on the board, $x_t(y_t \in B_t)$, and play the same appointment game tomorrow with y_t now being part of tomorrow's incumbent set, $y_t \in I_{t+1}$. Party i will only accept candidate y_t if this payoff is greater than or equal to the payoff from leaving the seat vacant today, $y_t \notin B_t$, having today's incumbents set policy, $x_t(y_t \notin B_t)$, and repeat the process tomorrow with an incumbent set that does not have someone appointed from period t, $y_t \notin I_{t+1}$. Define a party's *minimally acceptable candidate* as the value of y_t who satisfies equation (4) with equality.

If one party controls both the Presidency and the Senate, then the candidate must satisfy condition (4) for that party only.[13] If one party controls the Presidency and the other controls the Senate, then an appointee must satisfy this condition for both parties. Thus, the problem confronting each party is to solve (3) subject to (4). However, only the nominating party is allowed to choose the value of y_t. The confirming party can only confirm or reject the nominee. Therefore, the nominating party chooses a value of y_t to solve (3) such that (4) is satisfied for the party controlling the Presidency and the party controlling the Senate. Since the nominating party wants to appoint as partisan a board member as possible, it will nominate the confirming party's minimally acceptable candidate. Thus, the nominating party will offer a candidate who solves (4) with equality for the confirming party. As a result, no nominees will be rejected in equilibrium and the board will always be at full strength.

Intuitively, the nominating party is trying to exploit the confirming party's willingness to trade off policy payoffs today against policy payoffs in the future. The confirming party may be willing to accept a less preferable appointee (and policy outcome) today for two reasons: 1) to avoid a worse, or more uncertain, policy outcome in the future if the current vacancy is not filled, and 2) discounting lowers the value of achieving a more preferred policy outcome in the future. Consequently, parameters such as the discount factor, α and a party's degree of risk aversion will determine each party's inter-temporal terms of trade and thus the policy preferences of today's appointee.

E. Electoral Cycles, Multiple Vacancies and Election Probabilities

The last three structural details needed to solve this dynamic optimization problem are the length of the electoral cycle (time between elections), the process by which multiple vacancies are filled and the probability structure of election outcomes.

With regards to the length of the electoral cycle, what matters is whether the board terms are longer than the electoral cycle or less than or equal to the electoral cycle. The benchmark model has frequent elections (every period). Later, the case of infrequent elections will be considered (when the electoral cycle is the same length as the board terms). Regarding multiple vacancies, I focus on the case in which only vacancies associated with a full term in office are filled while partial terms are left vacant. The main reason for this assumption is brevity -- it reduces the scope of the problem since it eliminates the need for determining the types of candidates who are acceptable to fill partial terms on the board. However, it is important to note that the method for dealing with multiple vacancies does not change the solution for the equilibrium appointment *function* when the board is at full strength (which it will be in equilibrium since nominees are never rejected). Consequently, the steady-state appointee is

13. This is due to the assumption that all party members have homogeneous policy preferences and majority rule in the Senate is all that is necessary for confirmation.

unaffected as well. The method for filling multiple vacancies does affect the points at which the appointment function is evaluated should the board ever fall below full strength.[14]

Since the outcomes of the elections are assumed to be random events, the probability space for election outcomes needs to be specified. The election state space depends on whether or not unified government is allowed. In the benchmark board model, it is assumed that there is perpetually divided government and thus there are only two election states: party 1 nominates and 0 confirms or vice versa. With unified government, there are four possible nomination/confirmation states.

Once the election state space is determined the remaining issue is whether or not election outcomes are time invariant. In general, election outcomes will be state-dependent or display persistence, i.e.; a party's probability of winning the next presidential election depends on whether it already holds the presidency. There is considerable evidence of electoral persistence in the form of an incumbent bias where the incumbent party has a greater than 50 percent chance of winning the next presidential election. In the benchmark model, election probabilities are assumed to be constant. In latter sections of the paper, the effects of time varying election probabilities and electoral persistence will be discussed. Under the assumption of constant election probabilities, let p denote party 1's probability of winning the next presidential election and $1-p$ be party 0's probability of winning.

14. With multiple vacancies, the confirming party requires that it be offered a sequence of appointees or a single package of appointees that gives it as much utility as leaving the seats vacant and having the incumbents on the board set policy. This required payoff is invariant of the method for filling multiple vacancies but it does impose a set of arbitrage conditions on the types of candidates who can fill the partial terms according to the method chosen for filling the multiple vacancies.

III. Policy without a Board

Since the objective is to determine how successful a policy board is at smoothing the movements in policy and minimizing partisanship, it is useful to describe the policy outcome in a model without a board. Three such models will be considered: the Alesina "winner-take-all" model, the Alesina-Rosenthal "winner-takes-most" model and a policy rule. In these policy regimes, if party i controls the executive branch and party j controls the legislative branch policy is set at $x_t = \theta_i$. The parameters θ_0 and θ_1 are assumed to be exogenously determined. It will be assumed that $0 \leq \theta_0 < \theta_1 \leq 1$. If we set $\theta_0 = 0$ and $\theta_1 = 1$, then we have the winner-take-all regime.[15] If $0 < \theta_0 < \theta_1 < 1$ we have the equivalent of Alesina and Rosenthal model where divided government moderates the setting of policy but it will still be partisan towards the party that controls the executive branch. In the simulation work, the winner-take-all regime will be used as the norm for comparison to the board model. The reason is to see how well a policy-board works in the most partisan world; if it works well in an extremely partisan environment, then any other institutional arrangements which moderate policy in the absence of a board will only be strengthened by delegating policy to an independent board.

Under either of these regimes, policy bounces around between, 0, θ_0, θ_1, 1 depending on the outcomes of the most recent executive and legislative elections. It is this variability of policy that the board structure is attempting to overcome. An important interpretation of these regimes, that will be used later, is that they are equivalent to shutting down the board -- there are no incumbents and policy control reverts back to the executive and legislative branches. Accordingly, we can write each party’s value function in the policy-by-government world as

15 This will also be the policy outcome if i nominates with unified government.

$$V_{i,t}(\varnothing) = \max_{x_t}[u_i(x_t) + \beta E_t V_{i,t+1}(\varnothing)] \qquad \text{for i = 0,1}$$

(5) $$= \max_{x_t}[u_i(x_t)] + \beta E_t V_{i,t+1}(\varnothing)$$

$$= u(\Phi_{it}) + \beta E_t V_{i,t+1}(\varnothing)$$

where the null symbol denotes no board incumbents and Φ_{it} is an indicator variable equal to θ_i if party i nominates in period t. The max operator only applies to the first term since x_t is assumed to have no impact on decisions in period t+1 and beyond. In short, this value function corresponds to a repeated one-shot version of an ultimatum game.

By recursion and the assumptions made regarding election probabilities, $V_{i,t}(\varnothing)$ can be shown to be equal to

(6) $$V_{i,t}(\varnothing) = u_i(\Phi_t) + \frac{\beta[pu_i(\theta_1) + (1-p)u_i(\theta_0)]}{1-\beta}$$
$$E_{t-1}V_{i,t}(\varnothing) = \frac{[pu_i(\theta_1) + (1-p)u_i(\theta_0)]}{1-\beta}.$$

The unconditional expectation of policy would be $E(x_t) = p\theta_1 + (1-p)\,\theta_0$ and the unconditional variance would be $Var(x_t) = p(1 - p)(\theta_1 - \theta_0)^2$.

One can think of a policy rule as a constitutional amendment that sets $x_t = E(x_t)$ for all t. Such an outcome is equivalent to what would arise from a cooperative Nash bargaining environment. Adopting a policy rule would produce the long-run average policy while eliminating all policy variability. Furthermore, it would raise total party welfare if the utility functions are concave. However, as was mentioned earlier, such an arrangement completely ignores the current wishes of the electorate since policy does not respond to the current power structure of the government. For example, if party 1 controlled both branches of the government, policy is still reflecting the preferences of party 0 even if it is presently a minority party. Consequently, stability comes at the cost of removing policy from the democratic process. A more appealing institutional design would produce the same level of stability but at least provide the *potential* for the current electoral outcomes to influence the direction of policy. It is to such an institution that we now turn.

IV. Policy with a Board -- A Benchmark Model

A. The Set of Acceptable Appointees

Since policy moderation is most likely to occur with divided government, it is interesting to see how well the board reduces policy variability with perpetually divided government. If it fails miserably in this case, there is no hope it will generate moderate policies under unified government. In the solutions that follow, the parameters θ_0 and θ_1 are the parties' threat points – either party can choose to shut down the board by refusing to nominate or confirm any candidate. With a maximum size of three members, the board will vacate in two periods or less and policy control reverts back to the government. Hence, the parties are deciding period-by-period whether or not to maintain the policy institution or eliminate it.

The benchmark board model will be solved under the following assumptions:

1. Perpetually divided government.
2. Linear utility.
3. Constant election probabilities.
4. Frequent elections or long board terms.

The reason for choosing these assumptions is that, as will be demonstrated below, they are necessary conditions for the existence of a steady-state equilibrium.

If there is unified government and party i controls the government, it will nominate and confirm purely partisan board members and $y_t = i$, $i = 0,1$. For y_t to be between zero and one, divided government must occur. Furthermore, if unified government can occur with positive probability but less than one, then there can be no steady-state appointee or policy. Thus, in order to obtain an interior value for y_t and to have the possibility of a steady state there must be perpetually divided government.

It is shown in Appendix A that the set of acceptable candidates, y_t, satisfying equation (4) when *both* board incumbents are present must satisfy the following condition:

(7)

$$u_i(y_{m,t}) + \beta u_i(\alpha y_t + (1-\alpha)y_{t-1}) + \beta^2 u_i(y_t) \geq u_i(\alpha y_{t-1} + (1-\alpha)y_{t-2}) + \beta u_i(y_{t-1}) + \beta^2 E_t u_i(\Phi_{t+2})$$

for i = 0,1 where the parameter α is the weight placed on the young incumbent's policy position when two board members set policy. The set of acceptable candidates are those values of y_t satisfying (7) for both parties.[16]

Equation (7) has a straightforward interpretation. The left-hand side is the stream of utility from appointing candidate y_t today and then initiating the process of shutting down the board in period t+1. The right-hand side of (7) is the stream of utility received from beginning the board shutdown today. Hence, accepting a candidate today must be preferred to shutting down the board. By putting y_t on the board today, party i receives utility associated with the policy desired by the median voter of the set [y_t, y_{t-1}, y_{t-2}]. In period t+1, policy will be a weighted average of y_t and y_{t-1} and the parties get discounted utility from that policy. In period t+2, y_t sets policy unilaterally and the parties receive discounted utility from that policy. From period t+3 on policy is set by the government. The terms on the right-hand side of (7) are the policy payoffs from having the incumbents set policy today, having y_{t-1} set policy in period t+1

16. For all linear and concave utility functions, this will be a non-empty set.

and then have policy revert to government control in period t+2. Since the government has control of policy from period t+3 onwards with either strategy, payoffs after t+2 cancel out.

Since both parties have the power to start shutting down the board today, doing so is the threat point for each party and the payoff stream associated with that strategy is the minimum payoff from playing the appointment game. Consequently, each party must get at least the utility payoff associated with the threat point in order to continue playing the appointment game. Knowing this, the nominating party will choose to offer the confirming party a candidate today such that (7) holds with equality for the confirming party. Essentially, the nominating party offers a candidate such that the confirming party is indifferent between shutting down the board and accepting the offer. As a result, in this non-cooperative bargaining environment, the nominating party extracts as much surplus appointment as possible from the confirming party with today's appointment.

There are several key points to make regarding equation (7). First, setting (7) to equality yields the reduced-form solution for $y_{m,t}$ but not for y_t. The exact solution of y_t depends on who the median voter will be today as a result of appointing someone today. To obtain the equilibrium value of y_t, we need to substitute each of the possible values for $y_{m,t}$ -- y_t, y_{t-1}, y_{t-2} -- into (7), solve for the value of y_t associated with each of these possible values and then determine the conditions under which this will be today's appointee. Hence, in every period there will be three possible equilibrium expressions for y_t depending on who will be today's median voter. In general, it is not possible to obtain analytical expressions from (7) for y_t but with linear utility it is straightforward to do so. Consequently, in the benchmark model, linear utility will be assumed in order to do theoretical analysis of the model's dynamics. With non-linear utility, numerical simulations will be done to study the properties of the equilibrium policy path.

Second, and not surprisingly, policy is path dependent -- policy today is a function of previous appointments and thus previous policies. Unlike Waller's [1992] result, appointee types are path dependent and a function of current board members. Nevertheless, although policy is path dependent, the functional form for determining policy is temporally stable. This implies that there is a fair degree of predictability as to the types of board members who will be appointed given the policy preferences of the incumbent board members and which party is confirming.

Third, given the intuition behind (7) it can be shown that a similar condition would apply to any size board. For example, if the board was made up of five members serving overlapping, five-year terms (which is the structure of the National Labor Relations Board, for example), then (7) would contain five terms on each side of the inequality. The interpretation of each term is the same as that used in the three-member board case. The problem with moving to five board members is that, unlike the three solutions for y_t arising in the three-member example, there are ***1620 solutions for y_t***! The left-hand side would have 5 possible outcomes for the five-member board, 6 possible outcomes with four-member board, and 3 possible outcomes with the three-member board.[17] Hence the left-hand side has 90 combinations. The right-hand side would have 18, which makes 1620 total combinations and thus 1620 solutions for y_t. Studying the five-member board analytically is a bit unwieldy to say the least but could be done numerically. A seven-member board such as the Federal Reserve Board of Governors would generate ***10,800*** solutions for y_t.

17. With the four-member board, policy is a weighted average of the middle two board members and there are six unique combinations with four members.

B. Steady-state Policy in the Benchmark Board Model

Equation (7) determines the dynamics of the appointment/policy path for an initial set of incumbents on the board. A natural question to ask is whether or not a steady-state appointee/policy exists in the benchmark board model. If so, then all policy uncertainty will be eliminated and partisan business cycles of the Alesina [1987] variety will not occur. Furthermore, it would be interesting to see how the steady-state policy in the board model compares to the policy rule proposed in the previous section.

Given that the nominating party will choose to offer a candidate who satisfies (7) with equality for the confirming party, a steady-state appointee would have to satisfy (7) with equality for both parties, i.e., the steady-state appointee is made regardless of the identity of the confirming party. Substituting in y for all y_{t-j} $\forall$ j and setting (7) to equality for i = 0,1 yields the following two conditions that y must satisfy:

$$
\begin{aligned}
&u(y) = E_t u(\Phi_{t+2}) \\
&u(1-y) = E_t u(1-\Phi_{t+2})
\end{aligned}
\tag{8}
$$

With all board members being the same, the only difference between the strategies associated with the right and left-hand sides of (7) is the payoff in the last period. Equation (8) says that the steady-state appointee equates the last period payoffs.

It is obvious from (8) that a necessary condition for a steady state to exist is that the expectation on the right-hand side be constant over time. This expectation term is the payoff the parties receive two periods from now if the board is shut down and policy control reverts back to the executive and legislative branches. The expected payoff in turn depends on who controls the executive branch and who controls the legislative branch two periods from now. In order for this expectation to be constant, the probabilities of party i controlling the executive branch must be constant, which means election probabilities must be time invariant. In the benchmark case, this is the underlying assumption. Furthermore, this expectation will only be time invariant if at least one election occurs in the next two periods for any t. In other words, elections have to occur every period or at least every other period. Otherwise, the nominating and confirming roles two periods from now will be whatever there are at time t. This means the elections must occur frequently relative to the length of the board terms. Thus, a necessary condition for the expectation term to be time invariant is that the electoral cycle be shorter than board terms. Again, this is the assumed structure in the benchmark.

Given these assumptions on the expectation of future policy and the assumptions made on the utility functions in (2), equation (8) becomes

(8') $$\begin{aligned} u(y) &= pu(\theta_1) + (1-p)u(\theta_0) \\ u(1-y) &= pu_i(1-\theta_1) + (1-p)u_i(1-\theta_0) \end{aligned} .$$

For any utility function satisfying u' > 0, u" ≤ 0, (8') implies

(9) $$\begin{aligned} y &\le p\theta_1 + (1-p)\theta_0 \\ 1-y &\le p(1-\theta_1) + (1-p)(1-\theta_0) \end{aligned} .$$

However, rewriting the second line of (9) shows that the steady-state appointee must satisfy

(9') $$\begin{aligned} y &\le p\theta_1 + (1-p)\theta_0 \\ y &\ge p\theta_1 + (1-p)\theta_0 \end{aligned} .$$

The only way for y to be a steady state is if it satisfies both expressions in (9') with equality, which will hold if and only if the utility functions are linear. With linear utility the steady-state policy is given by:

(10) $$x = y = p\theta_1 + (1-p)\theta_0 \quad .$$

Note that the steady-state policy is the same as the proposed constitutional rule and so all policy variability has been eliminated. Consequently, there is no policy uncertainty and the partisan business cycle has been eliminated. The advantage of this institutional set-up over a policy rule is that the current electorate's wishes are not completely ignored since the outcome of the elections determines which party nominates. In principle, the nominating party has a first-mover advantage that allows it to appoint someone whose policy choice reflects the position of the victorious party. It was argued earlier that this first-mover advantage is a form of political accountability. However, the system of checks and balances created by the confirmation process ensures that the parties compromise. Once they reach the steady-state policy, neither side is able to force the other to deviate from it. The end result is that society achieves perfect policy stability with political accountability. Furthermore, the constitutional rule is achieved even though policy is set in a purely discretionary fashion. This is just an example of the old adage that discretion is preferred to rules because discretion can always replicate the rule.

Another important point regarding (9') is that it was derived using only the last period payoffs in (7). If the expectation term in (8) is time stationary, then the expressions in (8) - (9') apply for a board of any size. So, if a steady state exists, it is the same for boards of all sizes. Board size only affects the dynamic path to the steady state in the benchmark model but not the steady-state policy itself.

A last point to make regarding (9') is that if parties are risk averse, no steady state exists. It then follows that policy will fluctuate even if all the other assumptions of the benchmark model hold. Consequently, risk aversion creates policy uncertainty and instability. Finding that risk aversion leads to greater policy variability is certainly a surprising result, particularly given

Alesina's [1987] results suggesting that it should reduce policy fluctuations. The reason for the difference is that Alesina uses a cooperative bargaining approach (Nash bargaining) while a non-cooperative bargaining framework is used here. To see how this matters, examine (8) above. With concave utility, party 1 would be willing to accept a minimum value of y, y_1, and party 0 would be willing to accept a maximum value of y, y_0, such that

$$\text{(11)} \qquad \begin{array}{l} y_1 < p\theta_1 + (1-p)\theta_0 \\ 1 - y_0 < p(1-\theta_1) + (1-p)(1-\theta_0) \end{array} \quad .$$

Again, rewriting the last line of (11) yields

$$\text{(11')} \qquad y_1 < p\theta_1 + (1-p)\theta_0 < y_0 \quad .$$

These conditions merely reflect the fact that each party would be willing to accept a less preferred but certain candidate on the board to avoid the policy risk associated with having policy revert back to unknown executive control. If the parties are risk averse we obtain a set of possible steady-state appointees rather than a singleton. In a cooperative bargaining environment with bargaining weights equal to the election probabilities, the parties would agree on the policy outcome $x = y = p\theta_1 + (1-p)\theta_0$. But in a non-cooperative bargaining environment, the nominating party knows the confirming party is willing to pay a risk premium to avoid policy uncertainty and extracts it.

So even if we happen to be at the point $y_{t-1} = y_{t-2} = p\theta_1 + (1-p)\theta_0$, y_t will not be since the nominating party i will push y_t towards the confirming party's value of y_i. Thus, the parties' willingness to pay a policy risk premium, and the nominating party's desire to extract it, breaks down the proposed steady-state equilibrium and creates policy variability. In a cooperative bargaining environment, the extraction of the risk premium from the other party does not occur.

C. <u>The Dynamics of the Benchmark Board Model</u>

To study the dynamics of the benchmark model, we need to obtain analytical expressions for y_t from equation (7). Let the per-period utility functions in equation (2) be given by:

$$
(12) \qquad \begin{aligned} u_1(x_t) &= x_t \\ u_0(x_t) &= 1 - x_t \end{aligned} \quad .
$$

Given these symmetric, linear utility functions, policy is a zero-sum game for the parties and the value functions for each party are linearly dependent, with $V_i(I_t) = A - V_j(I_t)$ where A is a constant and j = 1-i. It then follows that the set of acceptable candidates collapses to a unique value of y_t and is the one satisfying equation (4) with equality for both parties.

Using (12) with (7) set to equality yields the equilibrium solution for the median voter in period t (and x_t) when *both* incumbents are present is given by:[18]

$$
(13) \qquad y_{m,t} = \alpha(1+\beta)y_{t-1} + (1-\alpha)y_{t-2} - \beta(\alpha+\beta)y_t + \beta^2 E_t \Phi_{t+2} \quad .
$$

Setting $y_{m,t} = y_t$, then y_{t-1}, and finally y_{t-2}, we can solve for the equilibrium appointment of y_t. Without loss of generality, let $y_{t-1} \leq y_{t-2}$. The solutions for y_t are:

18. The value functions (A2)-(A4) in Appendix A can be used to determine the equilibrium appointments that would arise should one or both of the incumbents be missing at time t.

(14)

$$a.\quad y_{m,t} = y_t$$

$$y_t = \frac{\alpha(1+\beta)y_{t-1} + (1-\alpha)y_{t-2} + \beta^2 E_t\Phi_{t+2}}{1+\beta(\alpha+\beta)}$$

$$\text{if} \quad y_{t-1} - \frac{1-\alpha}{\beta^2}(y_{t-2} - y_{t-1}) \le E_t\Phi_{t+2} \le y_{t-2} + \frac{\alpha+\alpha\beta}{\beta^2}(y_{t-2} - y_{t-1})$$

$$b.\quad y_{m,t} = y_{t-1}$$

$$y_t = \frac{[\alpha(1+\beta)-1]y_{t-1} + (1-\alpha)y_{t-2} + \beta^2 E_t\Phi_{t+2}}{\beta(\alpha+\beta)}$$

$$\text{if} \quad E_t\Phi_{t+2} \le y_{t-1} - \frac{1-\alpha}{\beta^2}(y_{t-2} - y_{t-1}) \le y_{t-2} + \frac{\alpha+\alpha\beta}{\beta^2}(y_{t-2} - y_{t-1}) - \frac{1-\alpha}{\beta^2}(y_{t-2} - y_{t-1})$$

$$c.\quad y_{m,t} = y_{t-2}$$

$$y_t = \frac{\alpha(1+\beta)y_{t-1} - \alpha y_{t-2} + \beta^2 E_t\Phi_{t+2}}{\beta(\alpha+\beta)} .$$

$$\text{if} \quad y_{t-1} + \frac{\alpha}{\beta^2}(y_{t-2} - y_{t-1}) \le y_{t-2} + \frac{\alpha+\alpha\beta}{\beta^2}(y_{t-2} - y_{t-1}) \le E_t\Phi_{t+2}$$

For $y_{t-1} \ge y_{t-2}$ the inequalities in (14) are reversed. To obtain the final reduced form solutions, the expressions for the expected policy two periods from now, $E_t\Phi_{t+2}$, must be inserted. Again, this expectation depends on the probabilities of electoral success for each party and the length of the electoral cycle. In the benchmark model with elections occurring every period we have $E_t\Phi_{t+2} = p\theta_1 + (1-p)\theta_0$. However, regardless of the process driving $E_t\Phi_{t+2}$ the expressions in (14) are the equilibrium appointment equations and thus will be used later when elections occur every 3 periods.

Although they appear to be complicated, expressions (14a)-(14c) are fairly intuitive. To see this, let $\theta_1 = 1$, $\theta_0 = 0$, $p = 1/2$ which makes $E_t\Phi_{t+2} = 1/2$. The type of board member appointed today, and thus today's policy, depends on what the parties expect policy to be two periods from now under winner-take-all relative to the board incumbents' policy preferences. So, for example, in (14a) if the expected policy two periods from now, $E_t\Phi_{t+2} = 1/2$, is between the policy positions advocated by the board incumbents then today's appointee and policy is between the incumbents position. So if future policy is in the middle, neither party will let current policy be driven away from the middle. From (14b), if both incumbents are sufficiently to the right of $E_t\Phi_{t+2} = 1/2$, then party 0 will not accept any appointee that drives policy further from the middle and therefore today's appointee must be to the left of the incumbents. With $y_{t-1} \leq y_{t-2}$, this makes y_{t-1} the median voter. The reverse is true for (14c). Consequently, in the benchmark model, the system of checks and balances tends to keep policy in the middle or drives it towards the middle.[19] To get a flavor for the dynamics of the benchmark model, Figures 1A and 1B show two simulated paths for x_t for the parameter specifications above. The figures reveal that, regardless of whether the policy starts off high or low, it converges relatively fast to the steady state (after approximately 14 periods).

A very surprising result forthcoming from the expressions in (14) is that, although there is board turnover and an election every period, there is no policy certainty even off the steady-state path! In other words, there are no policy surprises or partisan business cycles at any time in the benchmark model. The appointments given by (14) are made regardless of who is the nominating party and, with $E_t\Phi_{t+2} = p\theta_1 + (1\text{-}p)\theta_0$, the expectation term in (14) does not depend

19. Proving formally that (14) is a stationary process is difficult since there are 3 separate second-order difference equations of which only one holds each period. It can be shown that as long as $.52138 < \beta$ and

on the current nomination/confirmation state. Consequently, the policy preferences of the incumbents are all that is needed to determine who the next appointee will be and thus what the next policy action will be.[20] Using this information, private agents can enter into contractual arrangements without having to worry about who will be in power after the election, i.e., they do not have to index wage contracts to election outcomes in order to protect themselves from policy uncertainty. A well-designed policy institution solves the problem for them. On a final note, this result illustrates that one cannot equate policy variability with policy uncertainty. Even though policy exhibits variability in the process of converging to the steady state, there is no policy uncertainty since private agents know exactly what policy will be in every period.

To summarize the findings of the benchmark board model, an independent policy board with discretionary powers will eliminate all policy uncertainty associated with electoral uncertainty and produce a steady-state policy that is equivalent to a policy rule. The implication is that, under the assumed conditions, a policy board will eliminate partisan business cycles and produce a superior outcome to the Alesina winner-take-all model and improves upon the Alesina-Rosenthal divided government model. Furthermore, policy stability is achieved without ignoring the policy desires of the current electorate, hence political accountability is maintained. In the next section, we will examine how robust these results are when the key assumptions of the benchmark model are relaxed.

$[(2-\beta^2)/2(1+\beta)]<\alpha<\beta/(1-\beta)$ the necessary and sufficient conditions for stationarity of each *individual* second-order difference equation will be satisfied. While not a guarantee, this at least suggests that (14) is stationarity for a reasonable parameter space.

20. This is essentially the same point made by Waller [1989] -- the incumbent set on the board contains valuable information concerning the path of policy, thereby reducing the likelihood of a policy surprise following an election. Of course, if there is any uncertainty regarding the parameters or preferences of the incumbents then this result will break down.

V. Extensions of the Benchmark Model

The key assumptions of the benchmark board model are:

1. Frequent elections or long board terms.
2. Constant election probabilities.
3. Linear utility.
4. Perpetually divided government.

Without these assumptions it was shown that a steady-state appointee and policy would not exist. Consequently, a policy board will not be able to produce the same outcome as a policy rule. Nevertheless, it will be shown that a policy board still produces greater output stability than the cases where the government directly sets policy. In this section, the assumptions listed above will be relaxed to see how each one affects the variability of policy relative to the non-board policy regimes.

A. Infrequent Elections or Short-Board Terms

The ultimate threat for each party in this bargaining game is to shut down the board and let policy control revert back to the government. The payoff from doing so depends on which party is expected to hold the executive office when the board shuts down, $E_t\Phi_{t+2}$. Assume that elections now occur every three periods, which is the same length as the board terms. If an election occurs between t and t+2, then $E_t\Phi_{t+2} = p\theta_1 + (1\text{-}p)\theta_0$. But if an election does not occur in the next two periods, whoever holds the executive office today will still be there in t+2 and thus $E_t\Phi_{t+2} = \theta_i$ if party i holds the executive branch in t. As a result, if elections occur every three periods and period t is an election period then $E_t\Phi_{t+2} = \theta_{i,}$ whereas $E_{t+1}\Phi_{t+3} = E_{t+2}\Phi_{t+4} = p\theta_1 + (1\text{-}p)\theta_0$ in the last two periods of the electoral cycle.

Substituting these expressions into (14) we can see that, in the first period of the electoral cycle, parties 0 and 1 will appoint individuals who are partisan in the sense that their policy preferences are closer to the preferred policy of the nominating party. Partisanship arises through the $E_t\Phi_{t+2} = \theta_i$ term. When party 1 nominates in the first period after winning control of the executive branch, it will appoint someone who is closer to party 1's threat point θ_1 and vice versa for party 0. Partisanship arises because of the nominating party's first-mover advantage. In the second and third periods the degree of partisanship is reduced since appointments will be based on the *expected value* of the two parties threat points rather than the threat points themselves. Thus, consistent with Waller's [1992] finding, appointments made immediately after an election are partisan but become more moderate as the next election approaches. The intuition behind this result is that, since elections can cause a reversal of roles, today's confirming party has more leverage in the bargaining process the closer is the next election. It has the option to reject a nomination, hope to win the next election and nominate someone more to its liking to fill the vacancy. The current nominating party is aware of this increased incentive to reject partisan nominations and opts to offer up more moderate nominees to ensure confirmation. Thus, the closer the next election, the more moderate is the appointee.

How is policy uncertainty affected by infrequent elections? With a three-period electoral cycle and three-period board terms, there is a policy surprise in the period following the election but in the second and third periods of the electoral cycle, no policy surprises occur. After roles are established, private agents know which party will be nominating and can solve for the median voter on the board with certainty in the second and third periods. This result is consistent with Alesina's [1987] rational partisan theory – elections create policy surprises immediately after an election but once rational agents know which party will be nominating they can deduce who will be appointed, and what the policy will be, in the latter part of an administration's term.[21]

21. Clearly this result would change if unexpected resignations were incorporated into the model.

More importantly, having policy set by the board creates smaller policy surprises than either the Alesina [1987] or the Alesina-Rosenthal [1996] model. Without loss of generality, assume that party 1 nominates in t-1 and wins re-election to the executive branch in period t. Under the winner-take-all regime of the Alesina [1987] variety, the policy surprise is

$$x_t - E_{t-1}x_t = (1-p) \quad .$$

In the Alesina-Rosenthal [1996] model of divided government the policy surprise would be

$$x_t - E_{t-1}x_t = [\theta_1 - p\theta_1 - (1-p)\theta_0] = (1-p)(\theta_1 - \theta_0) < (1-p) \quad .$$

With divided government and a policy board, the policy surprise will be of the form

$$x_t - E_{t-1}x_t = y_{m,t} - E_{t-1}y_{m,t} = \lambda(E_t\Phi_{t+2} - E_{t-1}\Phi_{t+2})$$

$$= \lambda(1-p)(\theta_1 - \theta_0)$$

where $\lambda = \beta^2/(1+\alpha\beta+\beta^2)$ if $y_t = y_{m,t}$ and $\lambda = \beta^2/(\alpha\beta+\beta^2)$ otherwise. Since $0 < \lambda < 1$ for $0 < \alpha, \beta < 1$, the policy surprise with the policy board is smaller than in either of the policy-by-government models.

In order to get a better understanding of the dynamics of the model, simulations were run and compared to the winner-take-all model. Table 1 and Figures 2A - 2C depict the outcomes of those simulations based on the parameter values $\alpha = .4$, $\beta = .9$, $\theta_0 = 0$, $\theta_1 = 1$ and $p = .45$. The simulations illustrate several interesting results. First, policy is substantially smoother with the board than the winner-take-all regime; its standard deviation is less than 1/4 of the winner-take-all regime. The low variability of policy is due to the moderation of appointments arising from the bargaining structure of the appointment process and divided government. Second, the staggering of board terms leads to 'smoother' transitions; it induces something akin to a policy 'cycle' as opposed to 'spikes' in the setting of policy. Third, Figure 2C reveals that the cycles are asymmetric; when there is a change of power in the executive branch, policy moves sharply towards the preferred policy of the new administration as it makes partisan appointments to the board. However, if the incumbent party is reelected in the next election, it will be able to continue pushing policy towards its preferred outcome through partisan appointments but the gains will be much smaller than achieved after wresting control away from the opposition. In short, there is a substantial 'honeymoon' period after an election in which the executive branch changes hands and during this honeymoon period the new executive gets what it wants. But the honeymoon disappears in the latter part of the administration's term and will not reappear to any significant degree if the incumbent party is reelected.

Finally, Table 1 reveals that the appointee in the first period of the electoral cycle will not typically be the median voter (if ever). The reason is that this appointee is always the most partisan, hence she will never tend to be in the middle. The importance of this appointee is not to actually set policy but to pull policy to one side or the other by acting as a policy threat point should vacancies arise for the latter seats on the board. To use a sports analogy, partisan first period appointees are used to determine 'field position' whereas the second and third period appointees do the actual 'scoring'.

B. Electoral Persistence

Up to this point it has been assumed that election probabilities are time-invariant. However, there is often an incumbent bias whereby the party holding the executive branch is likely to retain control. Thus it is important to understand how incorporating time varying election probabilities into the model affects the variability of policy. To do this in a simple fashion, assume that election probabilities can be modeled as a Markov chain with transition matrix **P**. Under permanently divided government, the transition matrix for determining who wins the next election is given by

(15) $$\mathbf{P} = \begin{bmatrix} p_{00} & p_{01} \\ p_{10} & p_{11} \end{bmatrix}$$

where p_{ik} is the probability party k, k=0,1, will nominate next period given that party i is currently nominating. Each row of **P** sums to one. With this probability structure and elections occurring every period, the expectation term in (14) is now given by $E_t\Phi_{t+2} = p_{ii}\theta_i + p_{ij}\theta_j$ where i denotes the nominating party in period t and j = 1 - i.

Even though elections occur every period, utility is linear and there is perpetually divided government, there will now be policy surprises every period but the magnitudes are less than in the policy-by-government models. To demonstrate this, let **P** be symmetric with $p_{00} = p_{11} \neq 1/2$, $\theta_1 = 1$, $\theta_0 = 0$ and assume that party 1 is nominating in period t-1. In the winner-take-all model, the policy surprise is

$$x_t - E_{t-1}x_t = (1 - p_{11}) \ .$$

After some tedious algebra, it can be shown that the policy surprise will be given by:

$$\begin{aligned} x_t - E_{t-1}x_t = y_{m,t} - E_{t-1}y_{m,t} &= \lambda(E_t\Phi_{t+2} - E_{t-1}\Phi_{t+2}) \\ &= \lambda(1 - p_{11})(2p_{11} - 1)^2 > 0 \end{aligned}$$

where $\lambda = \beta^2/(1+\alpha\beta+\beta^2)$ if $y_t = y_{m,t}$ and $\lambda = \beta^2/(\alpha\beta+\beta^2)$ otherwise. Since $0 < \lambda < 1$ for $0 < \alpha, \beta < 1$ and $(2p_{11} - 1)^2 \leq 1$, the policy surprise with the board is again smaller than in the winner-take-all model. It can be shown that the same is true for the winner-takes-most model as well. The reasoning is that elections can change the nominating state and thus the path of expectations thereby creating a surprise. Taking the derivative of the expression above with p > 1/2 reveals that the further p_{11} is from 1/2, the greater is the surprise and the more volatile policy will be.[22] With $p_{ii} > 1/2$, the current nominating party is more likely to be in control of the executive branch two periods from now and thus by shutting down the board is more likely to get the policy it most prefers. Hence, it uses this advantage to appoint more partisan board members and this induces more variability in policy. Figures 3A and 3B illustrate exactly this point. Nevertheless, the variance of policy is still substantially lower than the policy-by-government regimes.

Lengthening the board terms will lower the volatility of policy caused by electoral persistence. The further out is the payoff from shutting down the board the smaller is the nominating party's advantage both through discounting and a smaller probability of retaining control far into the future. Hence, policy variability and welfare can be improved by lengthening board terms but at the cost of reducing political accountability.

C. Non-Linear Utility and Risk Aversion

Assuming linear utility allows for analytically tractable solutions. But with linear utility, the parties are risk neutral, consequently, they only care about the average level of policy and not its variability. This raises the question of why they would want to have policy smoothed in the first place. Hence, the assumption of risk aversion appears to be more relevant for studying a policy board. But imposing risk aversion requires the use of numerical methods to study the behavior of policy and the equilibrium appointments.

Before embarking on such a path, it is worth conjecturing how risk aversion can alter the results obtained in the linear case. Risk aversion means that each party will be willing to pay a premium to avoid uncertain outcomes which translates to a willingness to accept less preferable candidates for the board today rather than create vacancies on the board and increase uncertainty

22. When p_{11}=1/2 then p_{10} is also 1/2 and election outcomes are not state-contingent. With elections every period and time invariant election probabilities, there will be no policy surprises.

about the direction of future policy. Due to its first-mover advantage the nominating party acts as the insurer; it offers to nominate a candidate today to fill a vacancy and reduce policy uncertainty tomorrow. Only the nominating party can do so, the confirming party can only accept or reject this "insurance" contract.[23] The confirming party pays for the reduction in uncertainty with a by accepting a candidate closer to the nominating party's preferred policy position. Risk aversion therefore leads to more partisan appointments which translate into larger movements in policy.[24]

A further implication of the confirming party's willingness to pay a risk premium is that the average value of policy should be skewed towards the party with the greater long-run probability of nominating. By having a larger probability of nominating a party is more likely to receive than pay the risk premium. In the linear utility examples, the steady-state policy outcome was $x = y = p\theta_1 + (1-p)\theta_0$. With risk aversion, $p > 1/2$ means party 1 will be the insurer more often and so the average value of policy, $\bar{x}$, should satisfy $p\theta_1 + (1-p)\theta_0 < \bar{x} < 1$. If $p < 1/2$, then the average value of policy should satisfy $0 < \bar{x} < p\theta_1 + (1-p)\theta_0$.

To summarize, risk aversion is conjectured to have two effects on the equilibrium policy path: 1) policy should be more variable, and 2) the average policy action will be biased towards the preferred policy of the party with the greater probability of nominating members to the board.

To carry out the numerical simulation, the party utility functions were assumed to be of the following CRRA form:

23. Recall that the nominating party has the choice not to nominate anyone. By creating a vacancy tomorrow and reducing the incumbent set, this makes policy more uncertain.

24. This immediately raises the issue that it is in a party's best interest to portray itself as being risk neutral in order to avoid paying the premium but this would require some degree of imperfect information in the model.

$$u_1 = x_t^{\gamma}$$

(16)
$$u_0 = (1 - x_t)^{\gamma}$$

where 1 - γ is the degree of relative risk aversion.[25]

Figures 4A and 4B display numerical simulations of the model with elections occurring every period, p = .45, $\theta_0 = 0$, $\theta_1 = 1$ and utility parameters equal to $\gamma = .9$ and $\gamma = .6$. Figure 4A reveals that if the parties are not too risk averse, policy will behave similar to the linear utility case; on average, policy is close to party 1's nomination probability (but slightly less) and there is little variability in appointment types and thus policy. Figure 4B shows that by increasing the degree of risk aversion, policy variability increases and the average value of policy moves closer to party 0's preferred policy since p < 1/2 (they receive a greater risk premium on average). But the fluctuations in policy are still substantially less than the winner-take-all case. Thus, risk aversion will generate policy variability but the existence of the board still leads to substantial smoothing of policy.

D. Unified Government

A key assumption made in deriving (7)-(14) was that unified government did not occur. This is clearly an unrealistic assumption; for example, in the period 1952-1996, the same party controlled both the U.S. Presidency and the U.S. Senate in 22 of those 44 years. For empirical conformity, allowing one-party control of the nominating and confirming roles appears to be an important extension of the model.

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25. The model was also simulated under the assumption of CARA utility. Though slightly different quantitatively, the numerical results were essentially the same as the CRRA case.

Given the assumptions regarding policy preferences, when one party controls both the nomination and confirmation decision, appointees to the board will be extreme partisans (zeros or ones).[26] Analytical solutions can be found when unified government is possible but require many simplifying assumptions to yield tractable expressions. Even then, the appointment type for the divided government states looks very similar to (14).

The interesting feature of unified government is that purely partisan appointments will create occasional policy "spikes" should one party maintain complete control for two periods. But despite these spikes, how stable is policy the rest of the time and how large do the probabilities of complete control have to be to create substantial policy variability? Figures 5 and 6 display a simulation of the equilibrium appointees and policy actions with $\theta_0 = 0$, $\theta_1 = 1$ and, respectively, the following transition matrices:

$$(17) \qquad \mathbf{P} = \begin{bmatrix} .015 & .535 & .445 & .005 \\ .015 & .535 & .445 & .005 \\ .005 & .445 & .535 & .015 \\ .005 & .445 & .535 & .015 \end{bmatrix}$$

$$(18) \qquad \mathbf{P} = \begin{bmatrix} .12 & .43 & .37 & .08 \\ .12 & .43 & .37 & .08 \\ .08 & .37 & .43 & .12 \\ .08 & .37 & .43 & .12 \end{bmatrix} \qquad .$$

The rows of **P** correspond to today's control state while the columns refer to tomorrow's control state. The first row and column of **P** correspond to unified government under party 1's control, the second row and column correspond to party 1 nominating and 0 confirming, the third row and column is the opposite and the last row and column correspond to party 0 having unified control. As a result, p_{11} is the probability that party 1 retains unified government given that it

26. This is the appointment structure assumed in Waller [1989].

currently has unified control, p_{12} is the probability that it retains the executive branch but loses the legislative branch given that it currently has complete control and so on. The values in (17) yield a long-run probability of unified government of .02 (1 in 50); for (18) the long-run probability of unified government is .20 (1 in 5). The long-run probability of each party nominating is 1/2. Compared to the similar model shown in Figure 4A, Figure 5A shows that policy will be more variable due to the possibility of unified government but not outrageously so. A policy spike will only occur once every 2500 periods on average and in 200 periods none is observed. Figure 5B shows that policy will display significant variability even if the likelihood of unified government is only 20%. In this simulation, policy spikes should occur every 25 periods or 8 times in 200 periods; there are 7 in the sample shown. The conclusion is that it does not take a large probability of one-party control to induce significant fluctuations in policy.

The key feature of one-party control is that policy will "spike" on occasion as a party wins control of both nomination and confirmation for a two periods. The spikes occur because the party in power can 'pack the board' with partisan appointees. However, to minimize the possibility of board packing, society can simply lengthen board terms and increase the size of the board. Board packing then requires maintaining complete control of the government for long periods of time, which is unlikely. Hence, altering the institutional structure of the board minimizes board packing and reduces the variability of policy.

VI. Conclusions

As long as elections are unpredictable, there will be political risk and policy variability. However, society is generally capable of devising institutional arrangements that reduce the excessive fluctuations in policy arising from political competition. Independent policy boards are in this category and the work presented here suggests that they should be relatively successful at reducing if not eliminating electoral uncertainty while maintaining a significant degree of political accountability. While electoral uncertainty has been used as the source of political risk, the results presented here should apply to other sources of political uncertainty.

The model developed in this paper provides a foundation for theoretical work on political appointments in a world of political competition. There are a number of interesting directions for fruitful extensions of the model. First, the benefits of elections need to be incorporated. Only the costs of elections (policy uncertainty) have been modeled. Garcia de Paso [1995] argues that policy boards create a “democracy deficit” that needs to be considered in the optimal design of policy boards and has done some work in this area.

A related issue, is that changes in political control reflect changes in the position of the median voter in society. If the change in the median policy preference is permanent, then policy should move immediately to the new median position. If the shift is temporary, then any policy shift may simply create fluctuations in policy that are undesirable from a long-run perspective. This latter view is consistent with the theme of this paper. But if society cannot tell if the outcome of the current election is a permanent or temporary shift in preferences, then it may well choose to have policy set by an independent board whose members are political appointees serving staggered terms. The issue then is what is the optimal term length for board members. Work by Waller and Walsh [1996] on optimal term lengths for central bankers may be useful for answering this question. The model presented here suggests that making board terms slightly longer than the electoral period may be optimal, ceteris paribus. So if the electoral cycle is 4 years, have members of a three-member board serve 6-year terms. Doing so is conducive to the existence of a stable steady-state policy while allowing a high degree of political accountability by giving the executive the ability to turn the board over fairly soon if it wins a back-to-back elections.

A third direction of research would be to change the theoretical structure to reflect the design of “real world” policy boards. For example, members of the U.S. Supreme Court serve lifetime appointments, whose endpoints are uncertain. Also, some boards have members with disproportionate influence on the setting of policy, such as the Chairman of the Federal Reserve Board. Furthermore, some boards are 'mixed' with some members being political appointees while other members are not. This would characterize the Federal Open Market Committee of the Federal Reserve which is composed of politically appointed Board Governors and non-politically appointed regional Fed Presidents. The Bundesbank also has a 'mix' of policy makers since a majority of the Bundesbank Council members are appointed at the state level not the federal level. Lohmann [1997] studies this institutional structure and finds that a board composed of all federal appointees would reduce electoral uncertainty relative to the current Bundesbank structure. However, this result is obtained in a world in which appointees are assumed to be pure partisans (0's or 1's). It is not clear how this result would change in the framework developed here.

Another potentially useful extension would allow current policy to affect future election probabilities. This would make elections endogenous to some extent and may allow a merging of appointment models with rational political business cycle models.

These extensions may well involve complicated models that do not yield analytical solutions. But, as has been demonstrated here, this should not be viewed as a hindrance to research; numerical methods widely used in other areas of economics also can be used to study dynamic political economy issues in new and interesting ways.

Appendix A

With three board members, there are four possible incumbent states: $I_t = (y_{t-1},y_{t-2})$, $(y_{t-1},\varnothing)$, $(\varnothing,y_{t-2})$, $(\varnothing,\varnothing)$. Consequently, four values of y_t are needed to solve the programming problem, which in turn means that there are four versions of equation (4).

Acceptable candidates for each incumbent state must satisfy:

(A1)
$$V_{i,t}(y_{t-1},y_{t-2}) = \max_{y_t}[u_i(y_{m,t}) + \beta E_t V_{i,t+1}(y_t,y_{t-1})] \geq u_i(\alpha y_{t-1} + (1-\alpha)y_{t-2}) + \beta E_t V_{i,t+1}(\varnothing,y_{t-1})$$

(A2)
$$V_{i,t}(y_{t-1},\varnothing) = \max_{y_t}[u_i(\alpha y_t + (1-\alpha)y_{t-1}) + \beta E_t V_{i,t+1}(y_t,y_{t-1})] \geq u_i(y_{t-1}) + \beta E_t V_{i,t+1}(\varnothing,y_{t-1})$$

(A3)
$$V_{i,t}(\varnothing,y_{t-2}) = \max_{y_t}[u_i(\alpha y_t + (1-\alpha)y_{t-2}) + \beta E_t V_{i,t+1}(y_t,\varnothing)] \geq u_i(y_{t-2}) + \beta E_t V_{i,t+1}(\varnothing,\varnothing)$$

(A4)
$$V_{i,t}(\varnothing,\varnothing) = \max_{y_t}[u_i(y_t) + \beta E_t V_{i,t+1}(y_t,\varnothing)] \geq \beta E_t V_{i,t+1}(\varnothing,\varnothing) \quad .$$

(A4) is the value function associated with the model without a board, hence it must be a strict inequality. Consequently, (A4) is equal to equation (5) in the text:

(A5) $$V_{i,t}(\varnothing,\varnothing) = u_i(\Phi_t) + \beta E_t V_{i,t+1}(\varnothing,\varnothing)$$

where $\Phi_t = \theta_i$ if party i nominates in t and θ_j if j = 1- i nominates. Update (A5) one period, take the resulting expression and substitute into (A3). Update this version of (A3) one period to obtain:

(A6) $$V_{i,t+1}(\varnothing, y_{t-1}) \geq u_i(y_{t-1}) + \beta E_{t+1} u_i(\Phi_{t+2}) + \beta^2 E_{t+1} V_{i,t+2}(\varnothing,\varnothing) \quad .$$

Use (A6) and (A1) to obtain the following inequality:

$$V_{i,t}(y_{t-1}, y_{t-2}) = \max_{y_t}[u_i(y_{m,t}) + \beta E_t V_{i,t+1}(y_t, y_{t-1})]$$

(A7)

$$\geq u_i(\alpha y_{t-1} + (1-\alpha)y_{t-2}) + \beta u_i(y_{t-1}) + \beta^2 E_t u_i(\Phi_{t+2}) + \beta^3 E_t V_{i,t+3}(\varnothing,\varnothing) \ .$$

Update (A7) one period, take expectations dated at time t, multiple the expression by β and add *u($y_{m,t}$)* to both sides to get the following inequality:

(A8) $$V_{i,t}(y_t, y_{t-1}) \geq u_i(\alpha y_t + (1-\alpha)y_{t-1}) + \beta u_i(y_t) + \beta^3 E_t u_i(\Phi_{t+3}) + \beta^4 E_t V_{i,t+4}(\varnothing,\varnothing) \ .$$

Party i's acceptable candidates, y_t, must satisfy both (A7) and (A8). However, when it is the confirming party, party i will be offered its minimally acceptable candidate who satisfies one of these expressions with equality. If (A7) holds with equality, then (A8) must hold with equality since it was obtained from (A7). However, if (A8) holds with equality then it is possible for (A8) to be strictly greater than (A7). Thus, we obtain the following inequality that must be satisfied for all acceptable candidates:

(A10)

$$u_i(y_{m,t}) + \beta u_i(\alpha y_t + (1-\alpha)y_{t-1}) + \beta^2 u_i(y_t) \geq u_i(\alpha y_{t-1} + (1-\alpha)y_{t-2}) + \beta u_i(y_{t-1}) + \beta^2 E_t u_i(\Phi_{t+2})$$

where we use the fact that $\beta^3 E_t[V_{i,t+3}(\varnothing,\varnothing) - u_i(\Phi_{t+3}) - \beta E_{t+1} V_{i,t+4}(\varnothing,\varnothing)] = 0$. (A10) is equation (7) in the text.

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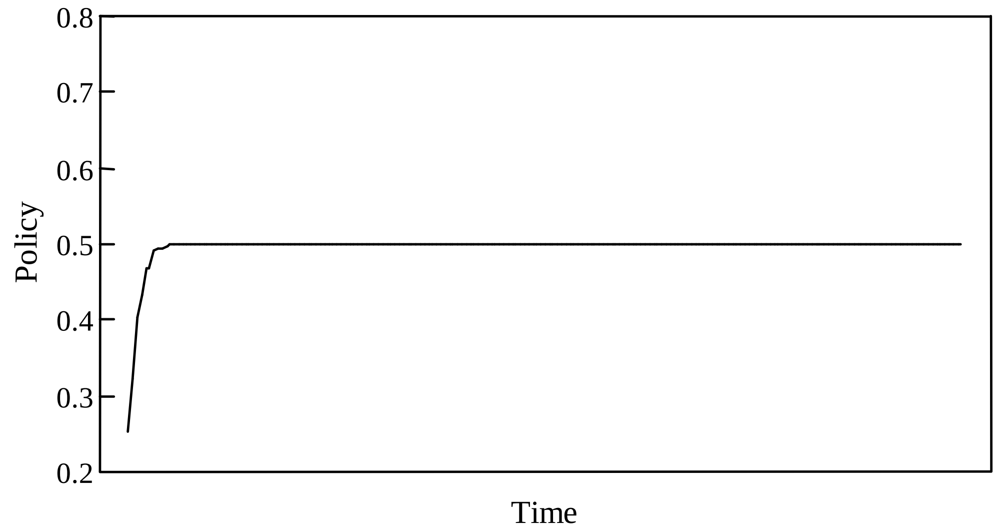
TABLE I

Period	Nomination	Confirmation	Appointee	Policy
31	1	0	0.853	0.577
32			0.626	0.626
33			0.620	0.626
34	0	1	0.194	0.620
35			0.407	0.407
36			0.364	0.364
37	1	0	0.790	0.407
38			0.545	0.545
39			0.577	0.577
40	1	0	0.854	0.577
41			0.627	0.627
42			0.621	0.627
43	0	1	0.194	0.621
44			0.408	0.408
45			0.364	0.364
46	1	0	0.790	0.408
47			0.545	0.545
48			0.577	0.577
49	0	1	0.189	0.545
50			0.394	0.394
51			0.358	0.358
52	0	1	0.128	0.358
53			0.312	0.312
54			0.313	0.312
55	0	1	0.097	0.312
56			0.289	0.289
57			0.302	0.289
58	1	0	0.778	0.302
59			0.524	0.524
60			0.567	0.567

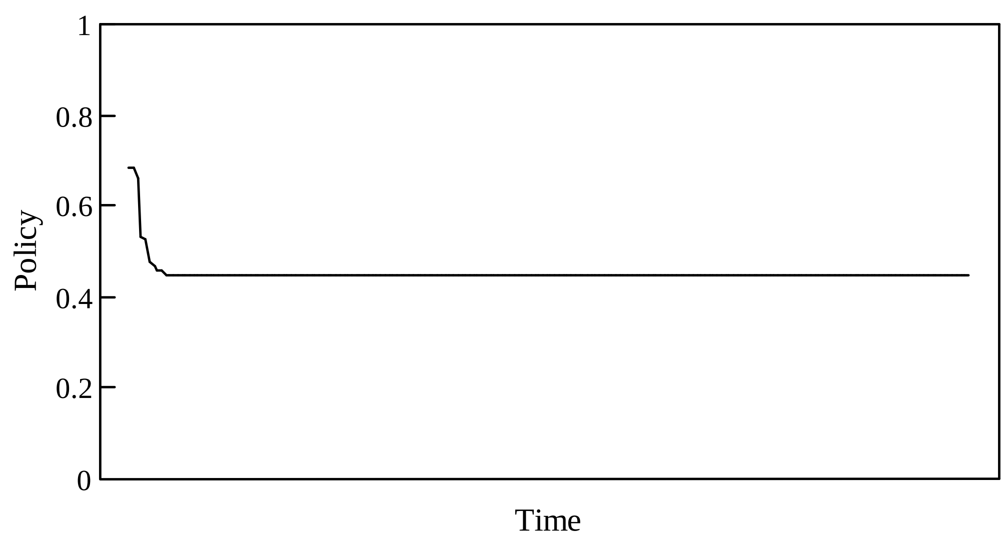
Steady State Dynamics

Figure 1A



Three member board, election every period. 200 period simulation.
α = .4 β = .9 γ = 1 p = .5

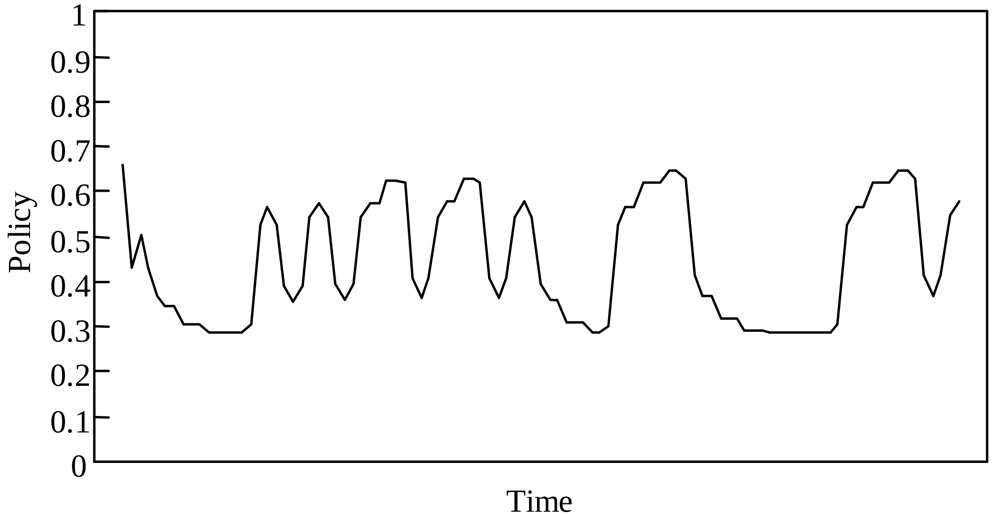
Figure 1B



Three member board, election every period. 200 period simulation
α = .4 β = .9 γ = 1 p = .45

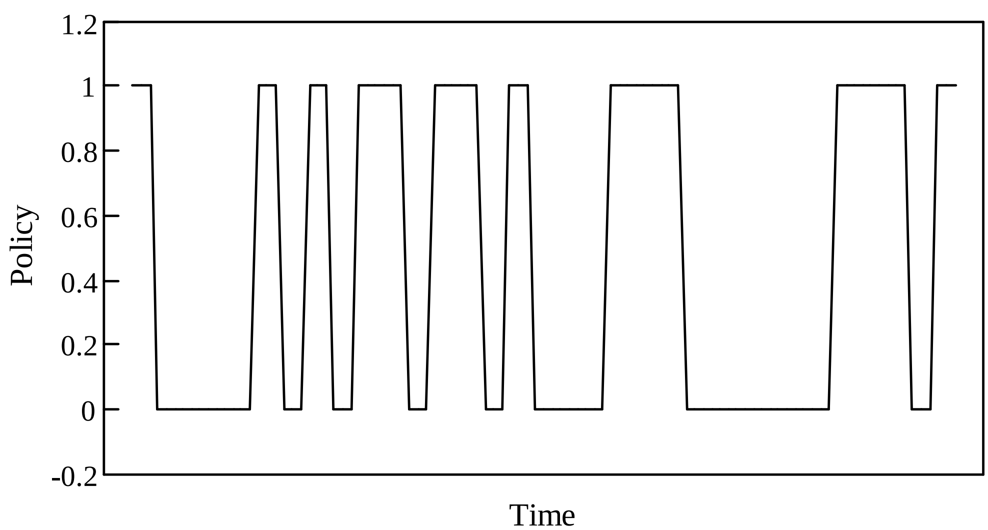
Infrequent Elections/Short Board Terms

Figure 2A



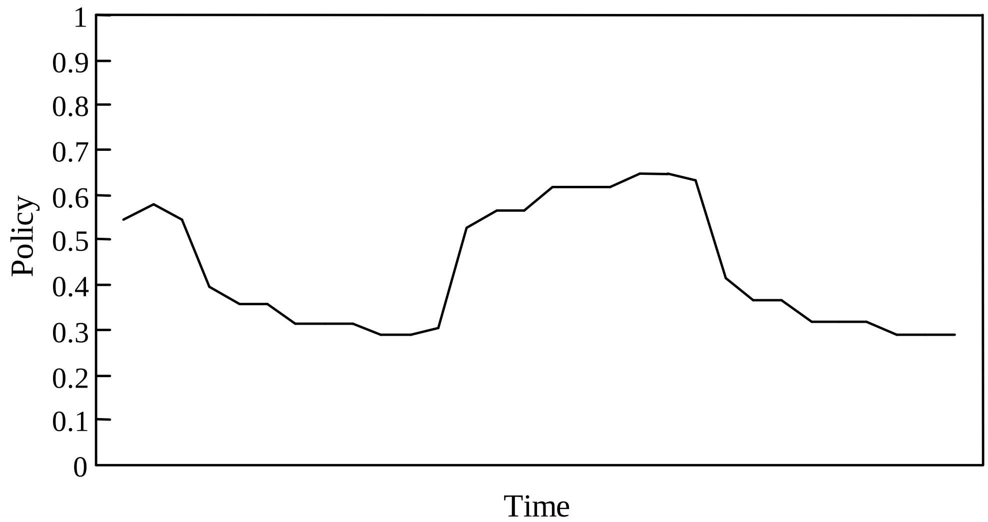
Three member board, elections every three periods. 100 period simulation
$\alpha = .4$ $\beta = .9$ $\gamma = 1$ $p = .45$
Mean: .446 Standard Deviation: .121

Figure 2B: Winner-Take-All



Mean: .4545 Standard Deviation: .497 100 period simulation

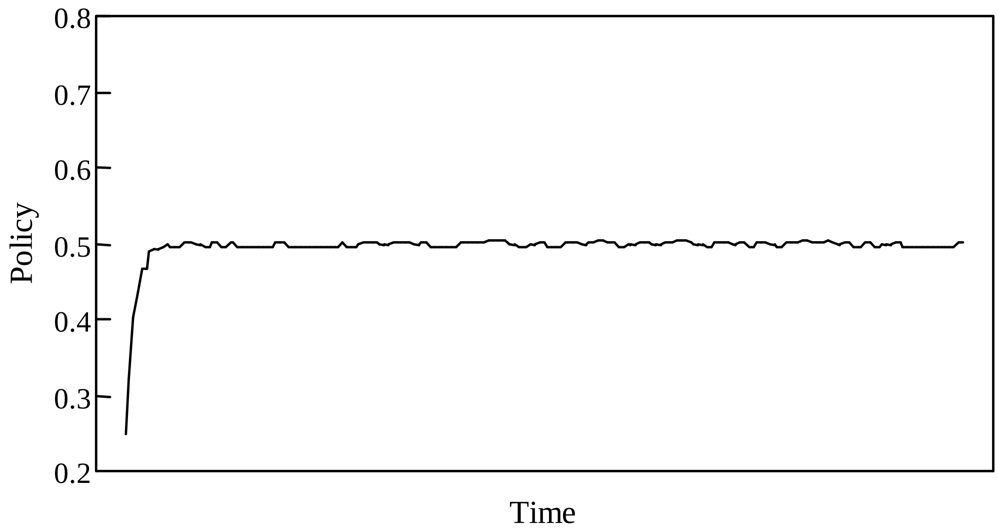
Figure 2C



Observations 60-90 from Figure 2A.

Electoral Persistence

Figure 3A

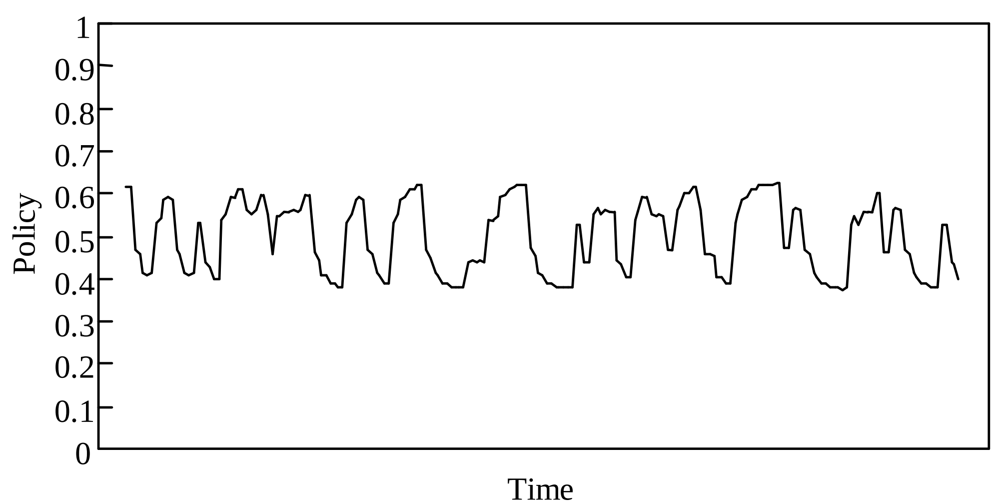


Three member board, election every period. 200 period simulation

$\alpha = .4$ $\beta = .9$ $\gamma = 1$ Mean (Ignoring the first 6 observations): .5

$p_{11} = p_{00} = .55$ $p_{01} = p_{10} = .45$ Long-run probability of party 1 nominating: .5

Figure 3B

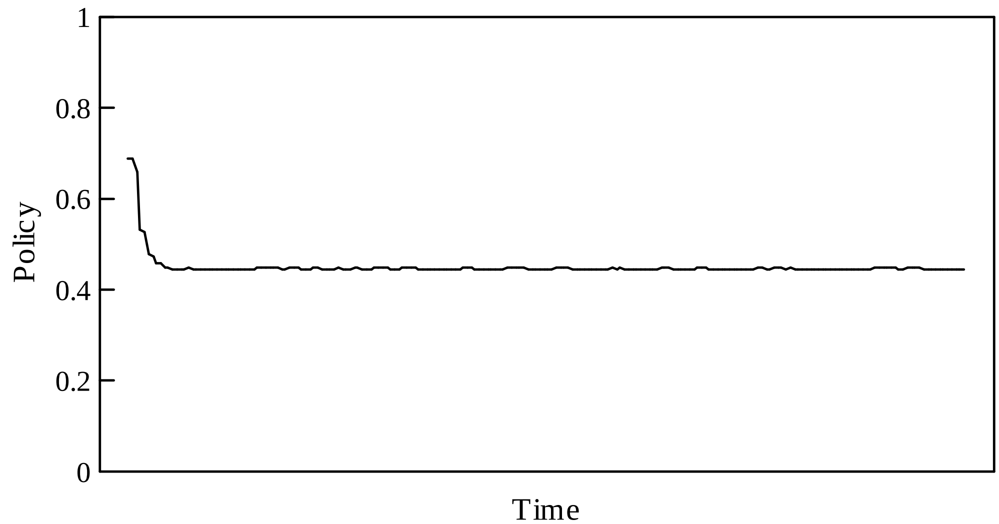


$p_{11} = p_{00} = .75$ $p_{01} = p_{10} = .25$ Mean: .510646 Standard Deviation: .077

Long-run probability of party 1 nominating: .5

Non-Linear Utility and Risk Aversion

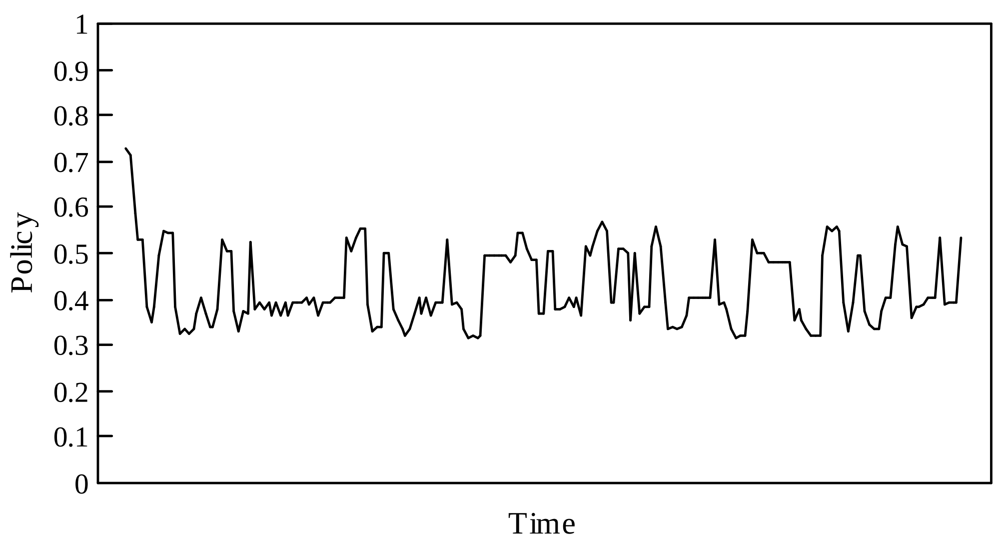
Figure 4A



Three member board, election every period. 200 period simulation

α = .4 β = .9 γ = .9 p = .45 Mean: .447 Standard Deviation: .003

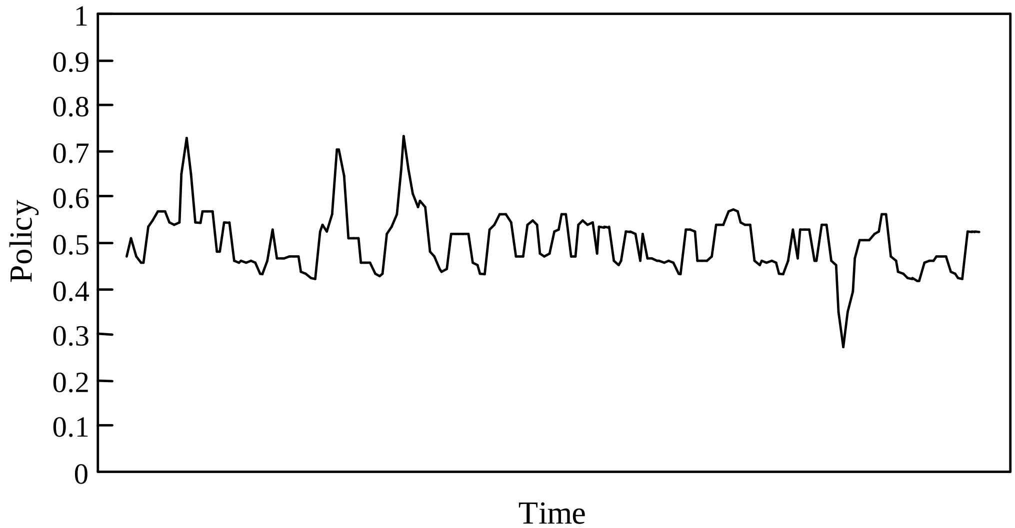
Figure 4B



Three member board, election every period. 200 period simulation

α = .4 β = .9 γ = .6 p = .45 Mean: .4277689 Standard Deviation: .080759

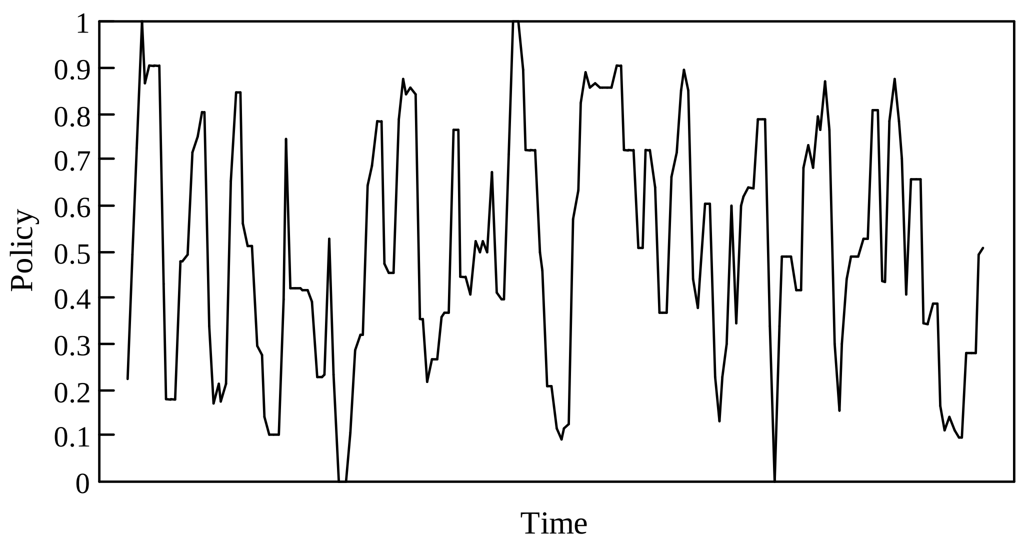
Figure 5A



Three member board, election every period. 200 period simulation

$\alpha = .4$ $\beta = .9$ $\gamma = .9$ Mean: .502788 Standard Deviation: .052028

Figure 5B



Three member board, election every period. 200 period simulation

$\alpha = .4$ $\beta = .9$ $\gamma = .9$ Mean: .511376 Standard Deviation: .2533