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# Vote splitting as insurance against uncertainty *

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**Abstract.** The present article offers a rational choice explanation for political ticket splitting. It considers a game-theoretic model of voting and bargaining within Congress and between Congress and the president. When parties are ideologically oriented and voters' utilities are state dependent, the model shows that if there is uncertainty about the true state of the world, ticket splitting emerges as a tool risk-averse voters use in order to insure themselves against extreme policies in bad states of nature.

**Key words**: vote splitting, bargaining, uncertainty, state-dependent utilities, insurance

## 1. Introduction

Political vote splitting is defined as "the simultaneous support by the same voters of candidates from opposing for different levels of political office" (Zupan, 1991). This is a persistent phenomenon in American post-war politics which seems to contradict the rational choice hypothesis, since rational voters are expected to vote for the party whose position is closest to their own, for all levels of political office.

The explanations supporting vote splitting can be aggregated into two classes. The first class describes vote splitting as a consequence of other political phenomena, which is unintended by the voters. Incumbency,[1] gerrymandering,[2] historical differences among geographical regions,[3] and issue-based voting,[4] all fall into this class of argument. These unintended interpretations give rise to the following criticism. First, they implicitly assume that voters have limited rationality. Second, they are often biased towards justifying a Democratic House with a Republican president, which fails to explain the more recent political developments in the United States. Finally,

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the above explanations are not based on a formal theoretical model that describes the rational behavior of the agents involved: voters, candidates and elected officials.

The second class of explanation describes vote splitting as a strategic choice of fully rational voters. The most substantial work in that area is by Fiorina (detailed in Fiorina, 1996) and Alesina and Rosenthal (described in Alesina and Rosenthal, 1995). Fiorina considers a single-dimension spatial model of voting in which parties' positions are rigid and policy outcome depends on which party runs the White House and which party dominates Congress.[5] In that framework, vote splitting is a consequence of the heterogeneity of voters. Alesina and Rosenthal also consider a single-dimension spatial model in which parties have fixed ideologies but where the policy outcome may now assume infinitely many values, depending continuously on the specific proportion of each party in Congress. Once again, vote splitting is a consequence of the heterogeneity of agents.

The purposeful explanations of vote splitting correct most of the criticism about the unintended characterizations. However, they suggest three new criticisms. First, these are not complete models of strategic interaction: parties are passive agents that make no explicit choice, and only voters take decisions. Second, although the interaction between parties in Congress and the president is a key element in the policy outcome, a bargaining process between those agents is not made explicit: a postulated equation describes the outcome as a function of the president's party and the relative representation of parties in Congress, in both cases. Finally, none of the models considers uncertainty as a causal factor of ticket splitting: Fiorina's model does not include uncertainty at all, whereas in Alesina and Rosenthal's model, uncertainty is used in order to induce another phenomenon: the midterm cycle effect.

This article's goal is to address the above shortcomings. First, it presents a single-dimension spatial model of fully rational agents. Second, the interaction between parties within Congress and Congress and the president is modeled by a specific bargaining game, in which parties and the president are strategic players. Finally, it emphasizes the role of uncertainty in the voters' decision to split their tickets.

The rest of the paper is organized as follows. Section 2 describes the model. Section 3 solves it for an equilibrium with vote splitting. Section 4 extends the basic framework to more interesting situations. Section 5 presents a simulation of the model in which split-ticket voting is optimal in both static and dynamic environments. Finally, the conclusion summarizes the main elements of the model, analyzes its shortcomings, and suggests further extensions.

## 2. The model

### 2.1. *Basic structure*

There are three sets of agents: a set V of voters, a set P of presidential candidates and a set C of congressional candidates. The game takes place in two stages. In the *ex ante* stage, voters simultaneously elect a president among the candidates in P, and n congressional representatives among the candidates in C. In the *interim* stage, the elected president and legislators bargain over a policy choice b in a set of feasible policies:[6] $B \subset \mathbb{R}$. The sets P and C are interpreted as the sets of types of candidates or, more precisely, the sets of party ideologies that each candidate represents. In order to model the American political environment, it is assumed that there exists exactly two distinct parties/ideologies,[7] which are characterized by a preferred policy in B: $P = C = \{b_1,b_2\} \subset B$, with $b_1 < b_2$. In particular, the utility function $w_p(b)$ (respectively $u_c(b)$) of a candidate $p \in P$ (respectively $c \in C$) is assumed to be a continuous, decreasing function of the distance between p and b (respectively c and b), where $b \in B$ is the policy negotiated in the *interim* stage.

The world is depicted by a probability measure space $(\Omega, \mathcal{F}, P)$, where $\Omega$ is the set of all (relevant) states of the world, $\mathcal{F}$ is a $\sigma$-field of subsets of $\Omega$ and P is the *prior* probability function on $\Omega$. By assumption, P is common knowledge. At the *ex ante* stage, when voters choose their representatives, they do not know the true state of the world, $\theta \in \Omega$.

Voters have identical preferences, which are state dependent. The utility function of a representative voter is denoted by $\varphi(b,\theta)$ where $b \in B$ and $\theta \in \Omega$ is the realized state of the world. Assume that for all $b \in B$, $\varphi(b,\cdot)$ is P-measurable and that $\varphi(\cdot,\theta)$ is a continuous concave function for almost all $\theta$ in $\Omega$.

Figure 1 describes the general form of the strategic game played by the voters and the candidates. Note the intrinsic source of tension: while the voters prefer different policies depending on the realized state of the world, the elected representatives' preferences are state independent.[8] Moreover, since the voters do not know the true state of the world at the *ex ante* stage, they cannot elect the representatives whose ideological positions are closest to theirs, as would suggest a median voter's approach. Here political ticket splitting emerges as a tool voters use to deal with the mentioned tension, as will become clear in the following sections.

### 2.2. *The bargaining subgame*

To avoid unnecessary complications, the number of congressional representatives is set to n = 1. Sections 4.2 and 5 consider the more general case of n > 1

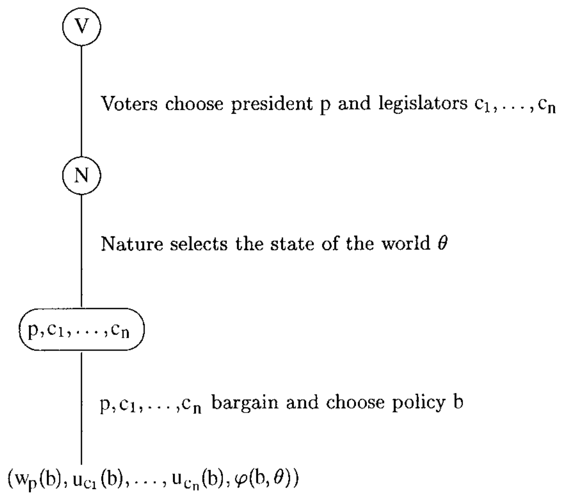


*Figure 1.* The structure of the game.

legislators. At the *interim* stage, the elected president (also referred to as p) and the elected congressional representative (also referred to as c) bargain over the set of feasible policies B, according to the bargaining subgame presented in Figure 2. Following Baron and Ferejohn (1989), the model assumes a stochastic rule: the president makes a proposal with probability $\rho \in [0,1]$ while the congressional representative is recognized with probability[9] $1-\rho$. If p proposes policy $b \in B$, c can either reject it (N) or approve it (Y). Similarly, if c proposes policy b, p can either sign it into law (Y) or veto it (N). If b is approved, it is implemented, the bargaining game then concludes in one section and the resulting utilities are $w_p(b)$ for the president, $u_c(b)$ for the legislator and $\varphi(b,\theta)$ for a representative voter, where $\theta$ is the realized state of the world. If a policy b is not approved, a second session takes place. The random mechanism determines anew who is recognized with the same probability distribution $(\rho,1-\rho)$. If a policy b is approved in session 2, it is implemented, thus concluding the bargaining subgame with utilities $\delta w_p(b)$, $\delta u_c(b)$ and $\delta \varphi(b,\theta)$ for p, c and a representative voter, respectively. The parameter $\delta \in [0,1]$ is a discount factor common to all agents. Finally, if no argument is reached, the reversion policy r is implemented, generating utilities $\delta w_p(r)$, $\delta u_c(r)$ and $\delta\varphi(r,\theta)$ for p, c and a representative voter, respectively.[10]

The following section describes the solution to the bargaining game and derives sufficient conditions for the optimality of vote splitting.

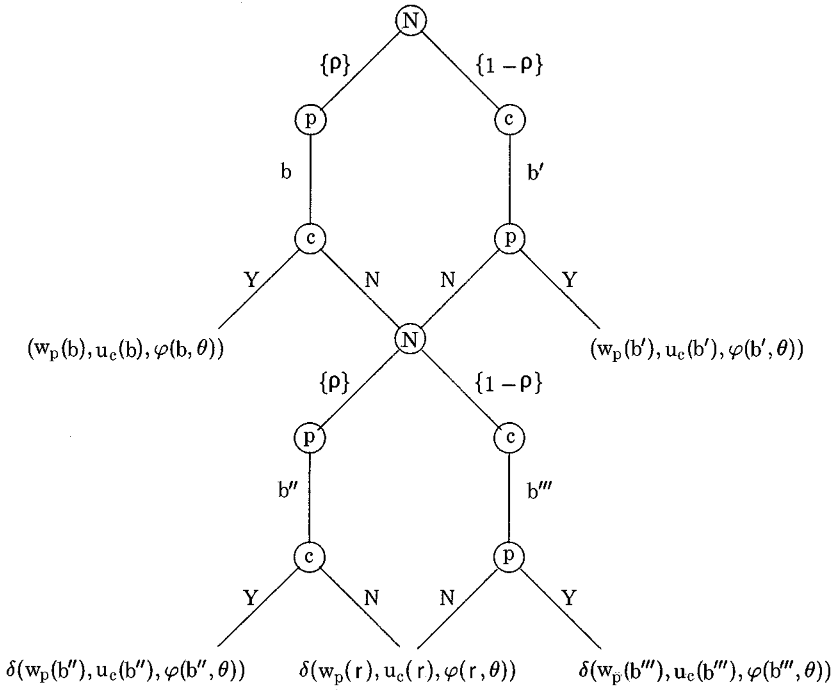


*Figure 2.* The bargaining subgame.

## 3. Ticket-splitting equilibria

### 3.1. *Solving the bargaining subgame*

If both elected officials belong to the same party, they agree on the preferred policy, say $b_i$, i = 1,2. Therefore the solution is trivial: $b_i$ is proposed and approved in session 1, resulting in utilities $w_p(b_i)$, $u_c(b_i)$ and $\varphi(b_i,\theta)$ for p, c and a representative voter, respectively.

Bargaining effectively occurs when the president and the legislator belong to different parties. In this case, the solution to the bargaining subgame (see Figure 2) is obtained by backwards induction. Suppose first that p proposes $b''$ in session 2. Then c approves it provided she obtains at least her reservation utility $u_c(r)$. Therefore, $b''$ is a solution to the following optimization problem.

$$(\mathscr{P}_{2p}) \quad \begin{cases} \max_{b\in B} w_p(b) \\ \text{subject to: } u_c(b) \geq u_c(r) \end{cases}$$

Similarly, if c proposes $b'''$, p accepts it if he can derive enough utility from that policy. Hence, $b'''$ is a solution to the problem below.

$$(\mathscr{P}_{2c}) \begin{cases} \max_{b \in B} u_c(b) \\ \text{subject to}: \; w_p(b) \geq w_p(r) \end{cases}$$

Notice that if r is between $b_1$ and $b_2$, then $b'' = b''' = r$. Consider now the president's decision at session 1. If p's policy proposal b is rejected, his expected utility is $E(p) = \delta[\rho w_p(b'') + (1\text{–}\rho) w_p(b''')]$. Moreover, c's expected utility by rejecting p's proposal is $E(c) = \delta[\rho u_c(b'') + (1\text{–}\rho) u_c(b''')]$. Let $\beta$ be a solution to the following problem.

$$(\mathscr{P}_{1p}) \begin{cases} \max_{b \in B} w_p(b) \\ \text{subject to}: \; u_c(b) \geq E(c) \end{cases} \quad \text{Then } b = \begin{cases} \beta \text{ if } w_p(\beta) \geq E(p) \\ r \text{ otherwise} \end{cases}$$

Similarly, let $\beta'$ is a solution to the problem below.

$$(\mathscr{P}_{1c}) \begin{cases} \max_{b \in B} u_c(b) \\ \text{subject to}: \; w_p(b) \geq E(p) \end{cases} \quad \text{Then } b' = \begin{cases} \beta' \text{ if } u_c(\beta') \geq E(c) \\ r \text{ otherwise} \end{cases}$$

Figure 3 gives a heuristic description of the game's solution when $r \in (b_1, b_2)$. If the president is recognized, b is approved, whereas $b'$ is the implemented policy if the legislator is recognized. Notice the traditional effects of bargaining. First, there is a convergence toward the "center" such that the approved policy is less extreme than it would have been if both officials belonged to the same party. Second, the agent that first makes the proposal can significantly affect the outcome toward her preferred point. The former characteristic drives the voters' electoral decision, with a consequent split ticket under certain circumstances, as presented in the next subsection.

### 3.2. *Voters' decision*

For each choice of a pair (p,c), a bargaining game of the above type takes place. Suppose voters elect a president of type $b_i$, i = 1,2 and a legislator of type $b_j$, j = 1,2. Denote by $b_{ij}$ the outcome of the corresponding bargaining game, when p is recognized. Similarly, denote by $b'_{ij}$ the oucome of the same game when c is recognized.

Consider the function $\psi : B \to \mathbb{R}$ defined by $\psi(b) = E[\varphi(b,\theta)]$, where $E[\cdot]$ is the expected value operator. Then a representative voter's decision problem can be described by the following graph, where $(b_i,b_j)$ stands for the choice of a president of type $b_i$ and a legislator of type $b_j$. Notice that $b_{ii} = b_i$, i = 1,2.

The optimal electoral decision for a representative voter will depend on the actual payoffs in Figure 4. Since the functions $\psi(\cdot,\theta)$ are concave for almost all $\theta$, so is $\psi$. If $\psi$ is strictly monotone, then the voters will elect both representatives from the same party, in which case, no ticket splitting

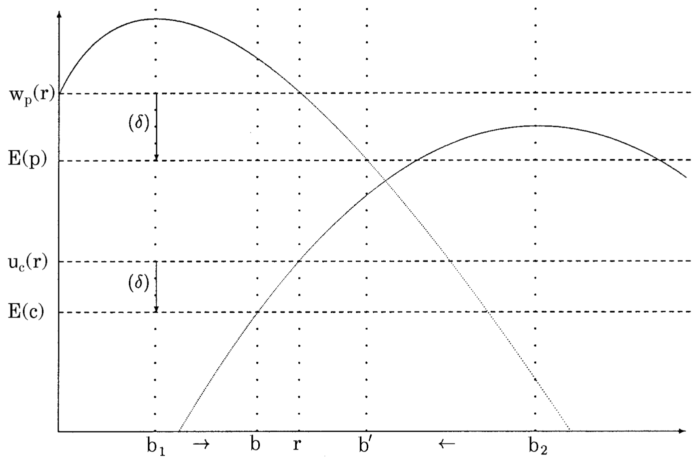


*Figure 3.* Solving the bargaining game.

will occur. However, if $\psi$ is not monotone, then it is single peaked and it may be optimal for a representative voter to split her ticket. The following proposition characterizes this situation.

**Proposition**: *Suppose that $\psi$ is strictly concave and nonmonotonic on $[b_1,b_2]$ and that $r \in (b_1,b_2)$. Then there exists a recognition probability for the president $p \in [0,1]$ and a discount factor $\delta \in [0,1]$ such that vote splitting is an optimal strategy for the voters.*

*Proof*: Suppose, without loss of generality, that $w_p(b)$, $u_c(b)$ and $\psi(b)$ are nonnegative for all b in $[b_1,b_2]$, and that $\psi(b_1) \geq \psi(b_2)$.

For each $\delta$, consider the bargaining game with a president of type $b_1$ and a legislator of type $b_2$. Since $r \in (b_1,b_2)$, $E(p) = \delta w_p(r)$ and $E(c) = \delta u_c(r)$. Therefore, $b_{12}(\delta)$ is the solution to the following problem.

$$\begin{cases} \max_{b \in B} w_p(b) \\ \text{subject to : } u_c(b) \geq \delta w_p(r) \end{cases}$$

Notice that $b_{12}(\delta)$ is a continuous function of $\delta$ and that $\lim_{\delta \to 0} b_{12}(\delta) = b_{12}(0) = b_1$ and $\lim_{\delta \to 1} b_{12}(\delta) = b_{12}(1) = r$.

A voter's utility, as a function of $\rho$ and $\delta$ is given by $\kappa(\rho,\delta) = \rho\psi(b_{12}(\delta)) + (1-\rho)\psi(b'_{12}(\delta))$. Since $\psi(\cdot,\theta)$ is continuous in b for almost all $\theta$, so is $\psi$. Moreover, since $\psi$ is nonmonotonic on $[b_1,b_2]$, if $b_M = \max_{b \in [b_1,b_2]} \psi(b)$, then $b_1 < b_M < b_2$. Consider two cases.

If $b_M \in (b_1,r)$, since $b_{12}(\delta)$ is continuous on $[b_1,r]$, there exists an interval $(\delta_m,\delta_M)$ such that for every $\delta \in (\delta_m,\delta_M)$, $\psi(b_{12}(\delta)) > \psi(b_1)$.

If $b_M \geq r$, then for every $b \in (b_1, r]$, $\psi(b) > \psi(b_1)$. In particular, there exists again an interval $(\delta_m, \delta_M)$ such that for every $\delta \in (\delta_m, \delta_M)$, $\psi(b_{12}(\delta)) > \psi(b_1)$.

Take $\delta$ in such an interval. It follows that there exists $\rho_M \in [0,1]$ such that for $\rho > \rho_M$, $\rho\psi(b_{12}(\delta)) > \psi(b_1)$. In particular, $\kappa(\rho, \delta) > \psi(b_1)$.

Therefore, for $\delta \in (\delta_m, \delta_M)$ and $\rho \in [\rho_M, 1]$, vote splitting is an optimal strategy for the voters. Q.E.D.

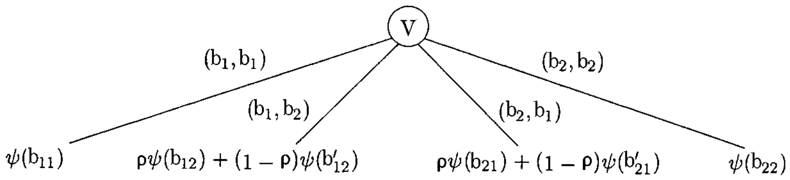


*Figure 4.* Voters' decision.

The previous proposition gives a rationale for vote splitting: if voters are risk averse and parties behave ideologically, with highly separated optimal points, voters may find it optimal, at the *ex ante* stage, to split their ticket in order to ensure a more moderate outcome. Notice that voters may adopt this behavior even though once the state of the world is revealed, a position closer to one of the parties might be preferred.

## 4. Extensions

This section describes how the simple model can be extended to more interesting environments. For notational simplicity, a president or a legislator from Party i (i = 1,2) is said to be of type i.

### 4.1. *Multiple sessions*

The limit on the number of sessions can be trivially extended to any finite number k. The bargaining subgame is solved by backwards induction and, in equilibrium, the game will conclude in one session. Although the equilibrium outcome depends on the number of sessions and oscillates for small values of k, it converges as the number of sessions increases. Table 1 presents the evolution of the equilibrium outcome for a game simulated in Section 5.1 (with the difference that here $\rho = 0.5$). The first and fourth rows display the number of sessions, up to 21 sessions. The second and fifth row present the corresponding expected utilities of a representative voter when the president

*Table 1.* A game with multiple sessions

| k | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| $\varphi_{12}^{k}$ | .5989 | .5922 | .5885 | .5865 | .5853 | .5846 | .5842 | .5840 | .5839 | .5838 |
| $\varphi_{21}^{k}$ | .6189 | .6230 | .6254 | .6268 | .6276 | .6280 | .6283 | .6284 | .6285 | .6285 |
| k | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| $\varphi_{12}^{k}$ | .5838 | .5837 | .5837 | .5837 | .5837 | .5837 | .5837 | .5837 | .5837 | .5837 |
| $\varphi_{21}^{k}$ | .6286 | .6286 | .6286 | .6286 | .6286 | .6286 | .6286 | .6286 | .6286 | .6286 |

is of type 1 and the congressional representative is of type 2; in this case convergence occurs if there are at least 13 sessions. Finally, the third and sixth rows present the corresponding expected utilities of a voter when the president's type is 2 and the legislator's type is 1, in which case convergence occurs if there are 12 sessions or more. Notice that voters' expected utility when both elected officials are of type 1 (respectively, type 2) is 0.6 (respectively, 0.4778).

### 4.2. *n congressional representatives*

The simplifying assumption about the number of congressional representatives is relaxed here. If there are n legislators to be chosen among members of two parties, then a second bargain occurs, namely, the (initial) bargaining within Congress, before a proposal b is directed to the president. Therefore, a new recognition probability $\mu$ must be defined, describing the chances that a legislator from the president's party will be recognized, when a legislator will propose a policy.

The solution to the extended game is technically equivalent to the original model. The bargaining game is solved by backwards induction, and the voters choose the president and the congressional representatives – in knowledge of the bargaining process – in order to maximize their *ex ante* utilities. The novelty in a representative voters' choice is that there are many more actions to be considered, compared to the simple four-choice decision problem of Figure 4. In fact, instead of a pair (president, legislator) voters have to consider all possible n + 1-coordinate elements of the form (president, $\text{legislator}_1, \ldots,$ $\text{legislator}_n$).

The new probability $\mu$ results in more flexibility to voters, Indeed, if $\mu$ depends on the relative strength of parties in the legislature, voters can manipulate the probability that a party is recognized, by selecting the proportion of legislators of each type in Congress. Section 5 illustrates how voters can use this "fine tuning" option to their advantage.

### 4.3. *A multiparty system*

The model extends trivially to a multiparty environment. As in the case of multiple congressional representatives, an initial bargaining within the Congress takes place, which is completed with bargaining with the president.

Here again, voters have the opportunity to perform a more precise selection, which will potentially increase their *ex ante* utilities. Indeed, more parties mean a wider variety of ideologies, which in turn means more options for the voters to choose from. Notice that exactly two parties with elected officials can be an equilibrium of this game. However, an equilibrium with more than two parties is not ruled out.

### 4.4. *Heterogeneous agents*

A natural way of relaxing the hypothesis of voter homogeneity is to assume that part of the electorate have ideologically-oriented utilities. Suppose that $\lambda_1$ percent of the electorate have quadratic utilities with bliss point $p_1$ (the "type 1" voters) while $\lambda_2$ percent have quadratic utilities with bliss point $p_2$ (the "type 2" voters), with $\lambda_1 + \lambda_2 < 1$.[11] Then, $\lambda_3 = 1 - \lambda_1 - \lambda_2$ percent of voters (the "type 3" agents) have the previously defined, state-dependent utilities.

The effect of this extension depends crucially on how legislators are elected. Assume that congressional representatives are selected in a nationwide proportional election. Then voters know *ex ante* that (at least) $\lambda_i$ percent of Congress members will belong to party i, i = 1,2. Therefore, type 3 agents' decision is how to choose the remaining $\lambda_3$ percent of Congress members and, if $\lambda_1, \lambda_2 < 0.5$, the President.

Clearly, the introduction of type 1 and 2 ideological voters reduces type 3 agents' ability to produce moderated outcomes. However, if moderation is optimal, and $\lambda_1$ and $\lambda_2$ are not too large, then vote splitting will still be an equilibrium outcome. Note that this approach coincides with empirical results that suggest vote splitters constitute a (small) proportion of the population (see Fiorina, 1992: 401). Moreover, the "3-type" approach presents a rationale for the party polarization assumption. Indeed, type i voters are Party i's members, who determine the party's ideology, i = 1,2. Type 3 voters, who are uncertain about the optimal policy, have no party affiliation and are the potential vote splitters.

### 4.5. *Incomplete information*

So far this article has assumed that party ideology positions are common knowledge. This hypothesis can be relaxed in a natural way. Suppose that a representative voter does not know the bliss point of party utilities, but knows *a priori* distributions of party types. These are given by $\phi_i$: $B_i \rightarrow [0,1]$, i = 1,2, where $B_i \subset B$ is a set of possible optimal policies for party i.

In this case, the outcome of the bargaining game $(p_i,c_j)$ becomes an expected utility, rather than a sure value. Therefore, voters engage in more sophisticated calculations. However, the final result remains the same: if the expected outcome obtained by selecting officials from different parties is higher than the (expected) outcome obtained by straight voting, ticket splitting will occur in equilibrium.

### 4.6. *Dynamic game*

This section extends the one-shot model to a repeated game framework. Assume that there are infinitely many periods t = 1,2,. . . . At period t, voters elect a president and n legislators, and a state of the world $\theta^t \in \Omega$ is realized. The state $\theta^t$ follows a known stochastic process and voters observe the realization of $\theta^t$ before they vote at t + 1.

At each period t voters face a situation similar to the one-shot game. However, the *ex ante* probabilities change from period to period. Therefore, voters can update their beliefs given the knowledge of the stochastic process and the observation of the previous period's state of nature.

The game is solved period by period as a static game, but because of the change in the *ex ante* probabilities, different patterns of electoral outcomes may be observed. Section 5.2 presents a simulation in which a divided government with a president from one party may follow another divided government with a president from the opposing party.

## 5. A simulation

This section considers a specific configuration for the parameters of the model and derives optimal ticket splitting in both the static and dynamic environments.

### 5.1. *The one-shot game*

The policy space is B = [0,1]. Party 1's preferred point is 0 while Party 2's optimal policy is 0.8. Parties' utilities are symmetric and quadratic on the distance to their respective preferred points. They are given by $w_p(b) = 1 - (p-b)^2$, $u_c(b) = 0.6 - (c-b)^2$, $p, c \in \{0,0.8\}$.[12] The revisionary policy is r = 0.4.

There are two states of the world, $\Omega = \{\theta_1,\theta_2\}$, $\theta_1$ being more likely than $\theta_2$: prob1 = $P(\theta_1) = 0.6$, $P(\theta_2) = 0.4$. The utility of a representative voter depends on the true state of the world as follows: $\varphi(b, \theta_1) = 1 - b$, $\varphi(b, \theta_2) = \sqrt{b}$, $b \in B$. Thus, if the true state of nature is $\theta_1$, the lower the policy b the better, whereas if the true state is $\theta_2$, the higher the policy the better.[13] Therefore, a voter's expected utility if $\psi(b) = 0.6(1-b) + 0.4\sqrt{b}$.

There are a president and n congressional representatives to be elected in a single national district. The president is elected by majority rule, whereas the legislature is chosen by proportional representation. Once the president and legislators are elected, bargaining takes place. The president's bargaining power resides exclusively in the veto threat: $\rho = 0$.[14] Let the president's party be denoted by i, the other party by j, and let $\mu$ be the proportion of i's members in Congress. Then a legislator from party i is recognized with probability $\mu$ and a party j's member is recognized with probability $1 - \mu$. A recognized representative makes a policy proposal, which is voted under a closed majority rule by the committee-of-the-whole. Then, the bargaining process continues as described in session 3.

Finally, because of the relative variation in the equilibrium outcome for a small number of sessions, assume there are twenty sessions. The common discount factor is $\delta = 0.8$.

The results of the simulation are summarized in Figure 5.[15] The dashed line represents voters' utilities when they elect a president from Party 1, as a function of the proportion of legislators from this same party. With a president from Party 1, the highest expected utility is 0.6042, which is attained when Party 1 holds 72.5% of all congressional seats (A). Note that a unified government with Party 1 yields utilities of 0.6 (B).

Similarly, the dotted line corresponds to the case where voters elect a president from Party 2. The highest expected utility if 0.6478, which is realized when voters elect 30% of Congress from Party 2 (C). A unified government with Party 2 gives voters the expected utility of 0.4778 (D).

Thus, the optimal electoral decision for the voters is to elect a president from Party 2 and give 70% of all congressional seats to Party 1 (C). Therefore, ticket splitting arises as an optimal strategy that voters use in order to cope with uncertainty and ideological party rigidity.

### 5.2. *The repeated game*

Suppose now the game is repeated every period.[16] At each period t, one of the previous states of the world occurs: $\theta^t \in \{\theta_1, \theta_2\}$. The state of nature follows a symmetric stationary Markov process given by the probability $\text{Prob}[\theta^{t+1} = \theta^t] = 0.6$, i.e., if the state at period t is $\theta^t$, then it remains the same at period $t + 1$ with probability 0.6, and it changes (to the other state of nature) with probability 0.4.

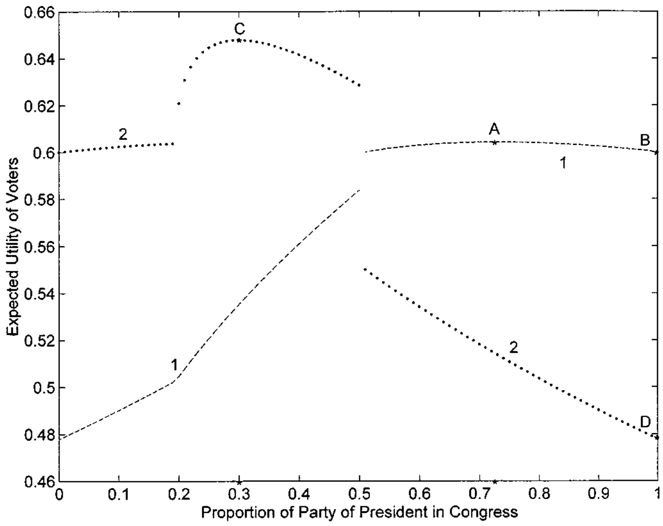


*Figure 5.* Veto model, prob1 = 0.6.

At the end of period t, voters observe the state $\theta^t$. Therefore, voters can update their *a priori* probabilities ($P(\theta_1)$, $P(\theta_2)$) before they vote at t + 1. Assume that the initial priors at t = 1 are $P(\theta_1) = 0.6$, $P(\theta_2) = 0.4$, as in the one-shot game analyzed in Section 5.1.

The solution to the repeated game is straightforward. At period t = 1, voters elect a president from Party 2 as well as 30% of all legislators from that same Party, by the results in 5.1. This choice will be repeated as long as the state $\theta_1$ is observed. When the state $\theta_2$ occurs for the first time, new calculations must be done, since the probability that $\theta_1$ will be the realized state of the world changes to prob1 = $P(\theta_1) = 0.4$. Figure 6 is analogous to Figure 5 for this new *a priori* probability. When a president from Party 1 is elected, the highest utility voters can get is 0.6204, which occurs when Party 1 holds 36.5% of the congressional seats (A). When the elected president belongs to Party 2, voters' utilities are maximized at 0.6176 if Party 2 constitutes 74% of Congress composition (B).

Therefore, when $\theta^t = \theta_2$, voters elect a president from Party 1 and 36.5% of the legislature from that same party at period t + 1. Consequently, the simulation presented here predicts switches from a president from Party 2 with a congressional majority from Party 1, to a president from Party 1 with a congressional majority from Party 2.[17]

*Nota bene*, this simulation makes a number of simplifying assumptions that should be dealt with in order to have a more realistic model. In particular, the dynamic behavior of the state of the world could be extended in many

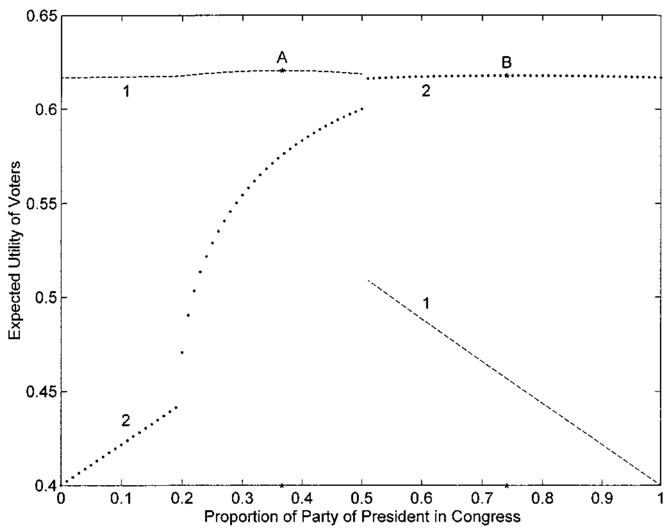


*Figure 6.* Veto model, prob1 = 0.4.

different ways, among which some dependency on the implemented policy seems intuitive. The point of this simplistic calculation is to isolate the role of uncertainty and to show that both vote splitting and switches in congressional majority may occur even when agents are totally homogeneous.

## 6. Conclusion

This article offers a rational choice explanation of political ticket splitting. A game-theoretic model of bargaining is considered, based on Baron and Ferejohn (1989). The main elements of the game are: a nondeterministic world, ideological parties, homogeneous voters and a bargaining process between the president and the legislators. The main result is that voters can find it optimal to use split-voting in order to insure themselves against uncertainty about the true state of the world.

In comparison to the current literature on purposeful vote splitting, the main distinctive characteristics of this paper's model can be summarized as follows. First, parties are active agents who take strategic decisions. Second, the cornerstone of all moderating considerations, the idea that Congress and the president interact in order to decide which policy will be implemented, is made explicit by the way of a well-defined bargaining process within Congress and with the president. Third, the moderation result does not rest on the heterogeneity of voters. Indeed, this paper shows that uncertainty about the state of the world can generate ticket-split voting even when voters are homogeneous. Finally, since the main result of the paper rests on such a fundamental concept as uncertainty, the model is extremely robust to the inclusion of new sources of tension such as multiple parties, (partially) heterogeneous agents, incomplete information about parties' ideological positions and dynamics.

The main shortcomings of this paper can be described as follows. First, the assumption of single dimensionality of the policy space bears no consensus in theoretical or applied political science. Second, the stochastic recognition rule is clearly an oversimplification, in which the internal institutional structure of Congress is abstracted. Third, the highly sophisticated behavior of voters is a general criticism of rational choice models. In particular, coordination among voters is required when $n > 1$ legislators are to be elected. Fourth, the homogeneity of voters (see, however, 4.4) is unrealistic. Fifth, political parties are completely policy-oriented; no re-election effect appears in their utilities, which precludes a Principal-Agent approach as advocated in Ferejohn (1986). Finally, parties cannot influence outcomes by pretending they have a more moderate bliss point. Therefore, neither adverse selection nor moral hazard effects can be studied based on the present model.

A complete model of political ticket splitting must address these shortcomings. In particular, more flexibility must be allowed to voters' and candidates' utilities. Voters' utilities must have both an *ideological* component, which values policy *per se*, and a *sociotropic* component, which values a policy by its effect on some socio-economic indicator of welfare (as in this model). Similarly, candidate utilities must reflect an *ideological* component as well as a *pragmatic* component, which values office holding, in the context of a repeated game. Those considerations are left as a suggestion for future research.

## Notes

1. The advantage that an office-holder has over her/his challengers.
2. The manipulation of electoral districts.
3. The Democratic Party position in southern states may be related to the Civil War.
4. Voters care about different issues at different levels of government.
5. In particular, there are only four possible outcomes.
6. The set B may be limited by the Constitutional framework, for example.
7. Section 4.3 extends the model to a multiparty system.
8. Section 4.4 shows how the assumption of homogeneity of voters can be relaxed in a way that supports party ideological rigidity.

9. The probability $\rho$ gives an institutional measure of the president's bargaining power. The particular case where $\rho = 0$ corresponds to the traditional veto model.
10. Section 4.1 points out that the model can be trivially extended to any finite number of sessions. Moreover, a stationary equilibrium for a game with infinitely many sessions can also be calculated.
11. The proportions $\lambda_1$ and $\lambda_2$ could be interpreted as party membership, for example.
12. The assumption implicit in these utilities is that there is a higher utility in being a president than in being a congressional representative. This assumption is natural, but not essential.
13. The motivation for the choice of $\varphi$ can be found in the traditional controversy about the ideal level of government intervention in the economy. If B measures that level of intervention, voters may find that government should not interfere if the economy is in a good state ($\theta_1$) whereas its intervention is needed if the economy is in a bad state ($\theta_2$). To give an example, a voter may believe that her job's stability depends on the state of the economy; if the economy is recessive, her job is in jeopardy, in which case she favors government investment in the area of social security; conversely, if the economy is expanding, her job is secure and she prefers less government spending and, consequently, lower taxes.
14. Veto threat is a natural way to model president's bargaining power. However, different specifications of $\rho$, such as $\rho = 0.5$, yield similar results.
15. It is interesting to compare these results with the models of Fiorina (1988) and Alesina and Rosenthal (1989). On one hand, like that of Alesina and Rosenthal, this model allows for a large number of policy outcomes; on the other hand, like Fiorina's model, it predicts a discontinuity in the behavior of the policy outcome as the majority in Congress switches from one party to another.
16. A period t may correspond to many years and does not correspond to one bargaining session. In fact, if the number of sessions is k, then all k sessions must occur within one period.
17. It is interesting to compare those results with recent developments in American politics. The Bush administration definitely marked the end of a two-superpowers' world, with the weakening of Russia and the supremacy of the United States. There was a clear change in the state of the world, which led to a change of emphasis from national security to internal policy issues. The subsequent switch of parties in both the presidency and Congress majority is compatible with the present modeling.

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