Careerism, Committee Assignments, and the Electoral Connection

JONATHAN N. KATZ *California Institute of Technology*
BRIAN R. SALA *University of Illinois, Urbana-Champaign*

Most scholars agree that members of Congress are strongly motivated by their desire for reelection. This assumption implies that members of Congress adopt institutions, rules, and norms of behavior in part to serve their electoral interests. Direct tests of the electoral connection are rare, however, because significant, exogenous changes in the electoral environment are difficult to identify. We develop and test an electoral rationale for the norm of committee assignment "property rights." We examine committee tenure patterns before and after a major, exogenous change in the electoral system—the states' rapid adoption of Australian ballot laws in the early 1890s. The ballot changes, we argue, induced new "personal vote" electoral incentives, which contributed to the adoption of "modern" congressional institutions such as property rights to committee assignments. We demonstrate a marked increase in assignment stability after 1892, by which time a majority of states had put the new ballot laws into force, and earlier than previous studies have suggested.

A common theme in research on congressional institutions is that members of Congress adopt institutions and rules that serve their desire for reelection. Important structural features of the committee system, for example, should be explicable in terms of their effects on reelection efforts. Often criticized, this Mayhewian reelection incentive premise is itself almost never put to the test, for the simple reason that significant changes in American electoral institutions have been quite rare.

We shall develop and test an explicit, electoral explanation for one of the key features of the modern House committee system—the norm of reappointing incumbent members of Congress to their same committee assignments at the start of each Congress. We argue that this so-called property right norm of reappointment reflects personalistic reelection incentives arising from the single-member district, secret ballot electoral system used in U.S. states.

The states' conversion from party-strip balloting to Australian (secret) ballots in the 1890s profoundly altered the electoral environment faced by incumbent members of Congress. The secret ballot allows voters to reward or punish each of their elected representatives (local, state, and national, all of whom might appear on the same ballot) individually. These reforms, we argue, made credit-claiming and other personal vote activities by members of Congress significantly more important for reelection, even at the very height of "strong party government" in the United States (Brady 1973).

The changes in balloting, therefore, were a key precursor to House adoption of a host of "modern" practices with important credit-claiming effects, from the reappointment norm to the expansion of professional staffs. Secure committee tenure allowed incumbent members of Congress to develop "careerist" patterns of behavior in the House (Price 1977)—including committee-related policy expertise—that provided fuel for increased legislative activity in the decades following the Australian ballot reforms.

We test these claims by examining committee tenure patterns for House members during the period between Reconstruction and the New Deal. Specifically, we show a significant increase in the probability of an individual House member retaining his assignments from one Congress to the next (about 10% for the typical member in our sample) immediately following a flurry of state adoptions of Australian ballot laws in the 1889–92 period.[1] This effect shows through even after controlling for such other significant influences as turnover in House membership and party control and each member's lengths of service in the chamber and on a particular committee.

We shall present the logic of our argument about electoral incentives and the structure of the House, then suggest and critique two stylized, alternative explanations for the origins of the seniority system, emphasizing their implications for committee tenure. The first, which we label the *institutionalization hypothesis*, emphasizes the revolt against Speaker Cannon in 1910 as a "critical moment" in the House's institutional development (Carmines and Stimson 1989). The second, which we call the *realignment hypothesis*, posits the election of 1896 as the critical moment that launched a wholesale transformation of House membership to "careerist" types from "amateur" types.

Next, we present a statistical model of committee tenure that allows us to examine the key, testable implication of our story against the stylized alternatives. The main testable difference between the models lies in the predicted timing of changes in tenure patterns. We show that our prediction—a marked increase in the rate

Jonathan N. Katz is Assistant Professor of Political Science, California Institute of Technology, and Brian R. Sala is Assistant Professor of Political Science, University of Illinois at Urbana-Champaign.

The authors thank the Office of Graduate Studies and Research and Department of Political Science, University of California, San Diego, for research support. Katz acknowledges the support of the National Science Foundation, partial funding provided by NSF grant SES-9022882 and by the Research Board, University of Illinois, Urbana-Champaign. We thank Garrison Nelson, Gary Cox, Mathew McCubbins, and the Inter-University Consortium for Political and Social Research for supplying data. We further thank Mike Alvarez, Gary Cox, Will Heller, Gary Jacobson, Sam Kernell, Mathew McCubbins, Scott Morgenstern, Keith Poole, Bing Powell, Paul Quirk, Glenn Sueyoshi, Barry Weingast, and Bob Weissberg for their helpful comments.

[1] "Typical" results in nonlinear models such as ours should be interpreted with care. We discuss this point further below in the data analysis section.

at which incumbents retain committee assignments from one Congress to the next after 1892—better explains the observed data than do the two stylized alternatives.

ELECTORAL INCENTIVES, BALLOT REFORM, AND STANDING COMMITTEES OF THE HOUSE

Do members of Congress design congressional institutions to accommodate their reelection interests? Legislative scholars have used Mayhew's simplifying assumption that contemporary members of Congress are "single-minded seekers of reelection" to motivate parsimonious, powerful models of how the modern Congress works (1974, 5). Of course, members of Congress are interested in more than just reelection. Nonetheless, more often than not the reelection incentive seems to work as a proximal goal, shaping members' behavior. We follow Mayhew's lead by maintaining it as our primary motivational assumption for incumbent members of Congress, even for the nineteenth-century members of Congress who are our main focus here.

We shall outline the theoretical underpinnings of our approach to congressional organization and then focus in on the key historical events we wish to explain. We show that the incentives arising from ballot reforms had a clear, independent effect on member of Congress preferences over House structures and that the reforms helped create the context for the modern, professionalized House. First, we shall discuss the relationship between electoral incentives and member of Congress preferences about committee assignments. Our basic thesis is that while there is a reelection value to committee assignments (e.g., opportunities to develop a reputation as a policy "expert," procurer of pork or influential decision maker in a particular policy arena), this value will also reflect characteristics of the electoral system. We then take an initial look at the empirical evidence on committee transfers and ballot law changes.

LEGISLATIVE ORGANIZATION, THE AUSTRALIAN BALLOT, AND THE ELECTORAL CONNECTION

The conventional wisdom on single nontransferable vote elections (of which the plurality district elections used in the United States are a special case) dictates that incumbents try to build up their "personal reputations" in order to hold office. Candidates generally have two characteristics with which to seek office: the collective reputation of the party to which they belong and their own, personal reputation (Cain, Ferejohn, and Fiorina 1987; see also Fenno 1978). Personal reputations refer to the attributes of a candidate that voters perceive to be particular to that individual, such as how personable, competent, or trustworthy he or she is. Collective reputations refer to the attributes that voters ascribe to all candidates bearing a particular party label, such as the perception that Democrats, on average, are more sympathetic to the interests of the poor than are Republicans or that Republicans are "tougher" on law-and-order issues.[2]

A single congressional candidate generally can do very little to affect his party's reputation. However, a weak collective reputation can in some cases be compensated for by a very strong personal one. As Cain, Ferejohn, and Fiorina put it, "Visibility is the cornerstone of an effective district strategy. Without visibility, representatives cannot have independent standing in the electorate's collective mind, and without independent standing they cannot anticipate personal success in otherwise unfavorable political circumstances" (1987, 27).

The electoral system itself, however, can limit the degree to which a candidate can establish "independent standing." For example, in proportional representation parliamentary elections, voters generally cast a vote for an entire list of party candidates rather than allocating votes to individuals within the list. The larger the district magnitude, the smaller the role any individual candidate's "personal reputation" will likely play in voters' choices between lists.[3] An individual member of parliament may be only one of several party candidates offered from that district. Thus, in a large-district-magnitude, closed-list proportional representation system, incumbents should care first and foremost about being ranked high on the party list. Logically, this motivation need not induce in the incumbent much interest in developing a personal reputation with voters.

The party-printed ballot used in most states' elections in the United States for several decades prior to the advent of the Australian ballot was similar to the proportional representation ballot in how it limited the relevance of any individual candidate's personal reputation for the voter's choice. The voter generally cast only a single ballot to weigh in on a number of contests (Albright 1942; Evans 1917; Fredman 1968). Hence, before the Australian ballot, the process of voting a "split" ticket (i.e., a mixture of different parties' candidates for different offices) was physically difficult.

The difficulty arose from two primary sources. First, the states required ballots to be written or printed. Because a large percentage of the potential electorate was illiterate in the nineteenth century, this requirement limited the ability of many voters to scratch or substitute for individual candidates (Kousser 1974). Second, ballots were generally deposited publicly in the ballot box, without the benefit of a private voting booth in which a voter could evaluate his choices away from prying eyes. Party agents could easily monitor voters to whom they had given ballots to make sure that those ballots were cast unaltered (Albright 1942).

A vote in favor of an individual candidate was tantamount to a vote for the entire partisan ticket. The less important the office, the less likely it seems that a voter would hinge his ballot choice on the personal characteristics of a single candidate. What this meant for the

[2] Petrocik (1991) refers to this as partisan "issue ownership."

[3] Of course, the personal reputations of candidates who have been tabbed by their party as prospective cabinet ministers (especially the party's nominee for prime minister) will likely have some effect on voting.

candidates is obvious: holders of low-ranking offices would have almost no *electoral* incentive to distinguish themselves in the eyes of voters. In presidential election years especially, the electoral fates of members of Congress were largely subject to the attractiveness of the top of the ticket. As Kernell put it, "The use of party ballots produced extremely high levels of straight party voting for every office from President down to Registrar of the Deeds.... Not until the adoption of the Australian ballot throughout the country in the late 1890s did many congressmen have much prospect of 'controlling' their district" (1977, 672; see also Rusk 1970).

A system that commingles a member of Congress's reelection efforts with those of his party's candidates for other offices sets up a collective action problem for members of a party ticket. Conceptually, each candidate on a ticket wants the others to do the hard work of attracting voters to the party slate. Without a solution to this collective dilemma, we might expect most candidates to shirk—to fail to put into the reelection campaign the kind of effort that we have come to expect from modern legislative candidates.

It appears instead that in the postbellum period candidates for various offices solved their collective dilemma by leaving electioneering to local party organizations and reputation building to the head of the ticket (see, e.g., Mayer 1967; Morgan 1969). As a result, the ticket's "collective reputation" was closely identified with the "personal reputations" and policy platforms of its top candidates and of the local machine. The private reputations of many candidates on a ticket probably were quite weak and the marginal impact of lower-office candidates on voters' choices, controlling for these first two effects, was probably nil.[4]

The Australian ballot system personalized elections by allowing voters to cast their votes office-by-office instead of forcing them to use a party ticket. Whereas members of Congress formerly would rationally have undersupplied patterned credit-claiming and position-taking activities in the House, they now would want to define and expand their personal reputations with voters. Reelection-seeking members thenceforth had incentives to blow their own credit-claiming horns as often as possible.

This is our argument in a nutshell: The ballot changes raised the interest of members of Congress in institutional arrangements that would help them build personal reputations. Stable committee assignments give members the leeway and confidence they need to become policy experts within their committees' jurisdictions. Policy experts are better equipped to claim credit and are more noteworthy position takers on policies within their committee's jurisdictions than are randomly selected members of Congress. Hence, a "norm" of reappointing incumbents to their same committees would be consistent with a widespread desire for building personal reputations.

Instituting this norm, however, would require the compliance of House agents responsible for making committee assignments. Prior to the revolt against Speaker Joseph Cannon (R-IL) in 1910, this authority resided in the speakership (since then they have de facto been chosen by party caucus committees; see Alexander 1916; Cox and McCubbins 1993; McConachie 1973). Given that the ballot reforms were adopted at the state level at different times and not imposed on all states simultaneously, when should the Speaker have reacted to this hypothesized change in member preferences over assignment patterns?

We assume that the Speaker was a responsive agent of the majority caucus and that his goal in making assignments would have been to maximize his party's probability of retaining its majority in the next election. When incumbent member of Congress's personal reputations do not significantly affect their reelection chances, all that matters to the Speaker in assignment decisions would be each member of Congress's marginal contribution in different committees. Depending on the jurisdictions of the differing committees and the relative salience of various issues to the electorate, the importance of individual committees to the party's overall reelection effort could rise and fall over time. Hence, the Speaker would have incentives to move his most productive members where they could have the greatest marginal effect—and to move slackers and disloyal members to where they would do the least damage.[5]

When personal reputations are important to reelection, however, the Speaker would want to take that fact into account. This implies that the Speaker may have treated members of Congress differently as their respective states adopted Australian ballot laws. There are two problems with this supposition, however.

First, committee assignments for members in a given Congress are *not* independent of one another, although we effectively treat them as such in our empirical model. We can think of the Speaker's prereform task as trying to maximize the net positive electoral externalities being generated by the various standing committees for majority party members seeking reelection. In other words, he wants to compose the committees so that the *system* best helps all members win reelection. But with the reforms, he must also worry about how transfers will affect the reelection chances of individual members of Congress. These constraints create a tension between the positive externalities that might arise from making a transfer and the potentially negative particular effects on the transferred member. Removing certain members of Congress from the pool of potential transferees would have a general effect on how well the Speaker could accomplish the goal of maximizing the positive effects of

[4] Aldrich (1995) provides a more in-depth discussion of the pre–Australian ballot collective action problems that we discuss here.

[5] This reasoning would seem to apply in reverse to the minority party's assignments. In other words, the Speaker would seem to have had incentives to minimize the contributions of minority party members of Congress to their party's probability of seizing control of the chamber. Historically, however, it seems that the minority party's leadership strongly influenced the actual assignments received by its members. Wholesale discrimination against minority members in the assignment process probably would have generated a strong response from the minority in the form of dilatory tactics on the floor and in committee, with negative net consequences.

the system, so we cannot simply analyze members of Congress from early-adoption states separately.

Second, as we shall discuss in the next subsection, the ballot reform movement swept very rapidly through the United States in the 1889–92 period. So many states adopted the new balloting procedures in such a short period of time that attempting to separate out the individual state effects on the assignment process would not likely be very informative. Further, as we shall discuss, the cluster of states adopting in the early period accounted for majorities of both parties. Since the Speaker is in effect the elected leader of his party, we would expect such a large change in his party constituency to affect critically his decision making on key institutional issues, such as committee assignments.

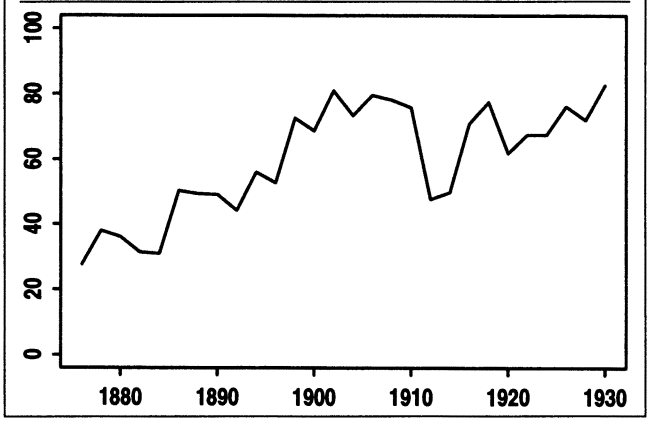
ELECTORAL REFORMS AND COMMITTEE ASSIGNMENTS IN THE POSTBELLUM ERA

We have argued that the modern electoral connection between individual candidates and the voters hinges on the structure of the electoral system. Voters consider both an incumbent's personal characteristics and the collective characteristics of the coalitions with which their member is aligned (i.e., party affiliation), but the weights voters attach to these separate components are at least partially determined by how votes are cast and aggregated. Hence, a system that allows voters to evaluate and vote for candidates on an office-by-office, case-by-case basis encourages incumbents to invest more in their personal reputations than when voters cannot discriminate between individual candidates on a partisan slate.

We shall provide some initial, empirical support for our focus on ballot reforms and the early 1890s as the critical period for the rise of "modern" congressional practices. This approach does not deny that the secret ballot had other effects as well. Probably the most important of these was its depression of turnout. Kousser (1974) noted that the official, secret ballot constituted a de facto literacy test, which effectively barred many thousands of potential voters (North and South) from exercising their franchise. He shows that this effect was known to many of the supporters of secret ballot legislation and argues that depressing the turnout of certain classes of voters was in fact the goal of many ballot "reformers" in the states.[6] The disfranchising effects of the secret ballot may have had important effects on the policy agendas pursued by incumbent legislators (by eliminating blocs of potentially like-minded voters), but we see no reason to believe that they significantly detracted from the personal-vote incentives of the ballot reforms.

The electoral incentive explanation we offer for changing patterns of member of Congress behavior does not directly imply that the Speaker should change the way he makes committee assignments or that party caucuses should become more active (or, for that matter, less active). Instead, for our purposes here, we have assumed that party leaders tend to be good, responsive agents for their party caucuses. But even if the leaders were of a more recalcitrant type, the rules also specified that the House could elect committee members by ballot in lieu of appointment by the Speaker.

FIGURE 1. Percent of Committee Assignments Retained, by Year



Party leaders' assignment authority has thus always been constrained, at least in principle. Before 1911, the Speaker was constrained both ex ante by the promises he had made vis-à-vis committees in order to win the post and ex post by the threat of revolt against specific assignments (Follett 1896; Stewart 1992a). Since 1911, the party caucuses or caucus committees have faced the same threat of revolt on the floor by ad hoc majorities opposed to their proposed slates. Any change in electoral incentives that affected a large majority of House members, therefore, could have induced a change in assignment practices.

Empirically it is easy to demonstrate that a major increase in the rate of reappointment (of incumbents to their same committees) took place in the 1890s. Figure 1 shows this aggregate effect; it plots the percentage of committee assignments held in House t that were retained by the same members in House $t + 1$.[7] The figure shows a sharp, decade-long climb in the percentage of assignments retained beginning in about 1892, followed by a relatively stable period during the first decade of the twentieth century. Fewer than half of all assignments held by returning members were retained by those members in the next House during 1877–90, whereas nearly three-quarters were retained by incumbents between 1896 and 1910.

A total of 32 states had installed secret, official ballot laws in time for the presidential election of 1892 (Evans 1917, 27; Ludington 1911). Seven more states adopted secret ballot measures prior to the 1896 presidential election. Table 1 details the dates when each state

[6] In addition to the turnout effect cited by Kousser, Rusk (1970) showed that the form of the secret ballot also affected voting. The Massachusetts office-bloc format proved to be significantly more amenable to "independent" (i.e., split-ticket) voting than was the Indiana party-column format.

[7] The graph implicitly controls for turnover, because only committee assignments held by returning members are considered.

TABLE 1. State Adoption of Australian Ballot Laws

State	Year Adopted	State	Year Adopted
	Elections Prior to 1892 (235 seats in 1892)		
AR	1891	MT	1889
DE	1891	NH	1891
IN	1889	OR	1891
ME	1891	SD	1891
MI	1891	WA	1890
MO	1889	WY	1891
NV	1891	CO	1891
OH	1891	IL	1891
RI	1889	KY	1892
VT	1890	MA	1888
WI	1889	MS	1890
CA	1891	NE	1891
ID	1891	ND	1891
IA	1892	PA	1891
MD	1890	TN	1891
MN	1889	WV	1891
	During 1893–96 (69 Seats, 1892)		
AL	1893	NY	1895
LA	1896[a]	KS	1893
FL	1895[a]	VA	1894
	After 1896 (39 Seats, 1892)		
AZ	1912[b]	NC	after 1910
NJ	after 1910	SC	after 1910[a]
OK	1908[b]	GA	after 1910
UT	1896[b]	NM	after 1910
CT	1909[a]	TX	1905

Sources: Ludington 1911 and U.S. Dept. of Commerce.
Note: For more detail on the laws adopted by the various states, see Ludington 1911. Alaska and Hawaii were not admitted to the Union until after the end of our study period.
[a]State adopted a multibox ballot law prior to 1892 (CT, FL, LA, NC, and SC).
[b]State admitted to the union after 1892 (AZ, NM, OK, and UT). In each case, an Australian ballot law was originally adopted by the territorial legislature and reaffirmed after statehood. The table notes the date of reaffirmation or of admission to statehood.

adopted the secret ballot and the size of each state's House contingent after the apportionment of 1890. As the table shows, the 32 early-adoption states accounted for nearly two-thirds of House membership in the Fifty-Third Congress (elected 1892), and most of those states adopted their laws during 1891 or 1892.[8]

The Australian ballot affected majorities in both parties right from the start. Out of 218 Democrats in the Fifty-Third House, 121 (55%) hailed from early-adoption states. On the Republican side, 109 of 127 came from early adopters. Nor was the ballot movement merely regional. Southern and border states with Australian ballot laws in place by 1892 accounted for 54 Democrats in the Fifty-Third. Several of the heavily contested northern and border states were also in the mix. Illinois sent 11 Democrats to the Fifty-Third House, against 11 Republicans; Indiana, 11 against 2; Kentucky, 10 against 1; Missouri, 14 against 1; Ohio, 11 against 10; Pennsylvania, 10 against 20. These same states in the 1894 midterm Republican landslide victory sent a total of only 13 Democrats to the Fifty-Fourth House (including zero from Illinois and Indiana), against 103 Republicans (for partisan affiliations of members of these Congresses, see Martis 1989).

The distribution of ballot law changes, therefore, was both widespread enough and balanced enough to support our claim that attentive Speakers should have responded positively to the new electoral incentives they induced in incumbent members. The ballot movement was no hare-brained, western populist scheme that could be ignored or marginalized by more sophisticated eastern party leaders. On the contrary, it had captured most of the crucial "swing" states, such as Indiana, Ohio, and Pennsylvania; and it had affected the election of majorities of both parties' memberships. Neither party could afford to ignore the ballot's effects if it were to challenge for national power.

INSTITUTIONALIZATION AND REALIGNMENT: ALTERNATIVE EXPLANATIONS FOR HOUSE "MODERNIZATION"

As we have noted, the literature on the House's historical development provides two rival explanations of its "modernization." Neither of these directly addresses the committee tenure question, although both approaches, we argue, imply the rise of something like a property right in committee membership. We shall present highly stylized interpretations of those explanations as applied to committee tenure patterns. The first such explanation we call the *institutionalization hypothesis* (after Abram and Cooper 1968; Polsby 1968; Polsby, Gallaher, and Rundquist 1969), as we see its explanation for tenure rights arising out of a general process of institutional maturation. The second arises primarily from several papers by Price (1971, 1975, 1977). We labeled this approach the *realignment hypothesis*, as Price says the realignment of 1896 was causally important for the timing of "professionalization" in the House.

House modernization for the institutionalization au-

[8] Evans attributed the flurry of ballot-law activity in 1889–92 to a reformist reaction to "the unprecedented use of money in the election of 1888" (1917, 27). Progressive reformers argued that the secret ballot would enhance the "independence" of candidates from the machines by reducing the participation of low-information voters (who were presumed to be manipulable). We prefer Kousser's argument that the secret ballot's turnout-depressing effects served the political interests of certain party elites (Southern Democrats in his case—to which we would add Northern Republicans). The most important case of delays in adopting a secret ballot law was that of New York, where Democratic Governor David Hill vetoed Republican-supported Australian ballot bills in 1888 and 1889 (Evans 1917, 20). A further partisan motivation for the official ballot lied in its regulation of entry to the ballot. Official ballot laws typically incorporated some specification of the requirements for nomination, such as a number of signatures on a petition. Pennsylvania, for example, required as many as 3,000 signatures to get a candidate on the ballot in Philadelphia County. California required more than 12,000 signatures to nominate a candidate for statewide office (Fredman 1968, 48). These stiff nominating requirements gave the more established organizations a distinct advantage—and encouraged wayward factions back into the organizational fold (or at least into fusion arrangements) in some cases.

thors was a long-term process of institutional maturation. In this view, Congress changed very gradually over the post-Reconstruction and early Progressive periods from an organization with high membership turnover and ill-defined and unstable internal (chamber) rules and roles to one with slow turnover and clear rules and roles for its career-oriented members. In the premodern House, party leadership cliques ruled. But in the modern, institutionalized House, power devolved from party leaders through the decentralized, standing committee system to the members themselves.

This devolution of power implied a demand for committee tenure property rights for, as Orfield put it, "slow turnover of members causes Congress to be dominated by members with a vested interest in the organizational status quo" (quoted in Brady 1980, 178). Institutionalization, therefore, ran contrary to the interests of party politicians and to the maintenance of "responsible" party government. For the institutionalists, it led ultimately to the replacement of the "czarist" Reed-Cannon, "strong Speaker," party-oriented House with the textbook "committee government" mode of politics familiar to most students of American politics.

The question for institutionalists (and for testing their claim vis-à-vis tenure patterns) is what form the transition should have taken. One simple supposition would be to expect committee tenure probabilities to increase incrementally (i.e., gradually and steadily over the transitional period). What counts as "incremental" is largely in the eye of the beholder, however, and therefore is difficult to falsify.

In order to identify a clear, testable hypothesis for this approach, we take advantage of the fact that the institutionalists place considerable emphasis on the revolt against Speaker Cannon in 1910–11 as "the single most important watershed in the history of the House and [an event] of crucial significance for an understanding of the modern House" (Abram and Cooper 1968, 54; see also Brady, Cooper and Hurley 1979; Fiorina 1977; Galloway and Wise 1976; Goodwin 1959, 1970; for an alternative view, see Jones 1968). We make use of this linkage between the institutionalization view and analyses of the revolt against Cannon to suggest a stylized reinterpretation of the institutionalization thesis.[9]

Polsby (and others) argued that the structure of the House changed critically following the revolt—from a world in which committee assignments reflected the discretionary authority of the Speaker to one in which "committees have won solid institutionalized independence from party leaders both inside and outside Congress" (Polsby 1968, 156).[10] The institutionalization approach to seniority, therefore, asserts that there are long-term effects at play but that the observable data should reflect the cataclysmic effects of the Cannon Revolt. The revolt against Cannon was in this view a "critical moment" in the institutional history of the House (Carmines and Stimson 1989). In our interpretation, the institutionalization thesis thus identifies causal factors both internal (gains from specialization and universalistic application of rules) and external (changes in turnover) that lead to the critical moment of the revolt, which we stylize as an internal, proximal cause of the changes in tenure patterns.

Price's critique of Polsby, Gallaher, and Rundquist's model of seniority argued that it was misspecified because it failed to account directly for membership turnover (and changes in majority party control of the House). We agree with these criticisms. We are less interested in his critique of Polsby, Gallaher, and Rundquist than we are in his explanation for the change, however. Our stylization of Price's realignment approach suggests that the timing of seniority (both tenure rights and promotion practices) as a "system" substantially predated the Republican factional disputes that culminated in the revolt. The key to the seniority system in Price's (1971) view was a cultural change in the House's membership. This change, in his view, did not require a cataclysmic *internal* event, such as the revolt, to trigger its manifestation in the institutional roles of members of Congress. Professionalized members sought and received stable committee assignments.

The source of the seniority system was a critical change in House membership from mostly "amateurs" to mostly "professionals." That changeover, Price argued, was signaled "above all by the collapse of the Democrats in the 1896 Bryan campaign" (1971, 9). The Democrats' collapse triggered a tremendous increase in incumbent Republicans' desire to stay in the House, such that "from 1896 on, career patterns and expectations had undergone basic structural change" (pp. 17–18). This formulation, again, suggests a "critical moment" in the House's institutional history, this time driven more by external factors than internal ones.

To be sure, there are many nuanced and sophisticated treatments of realignment in the literature that do not insist on the 1896 election as *the* critical date (e.g., the essays in Campbell and Trilling 1980). It is not our goal here to determine whether or not the 1896 election was realigning.[11] Indeed, we largely agree with Price's theoretical points that member of Congress goals and desires drive House organization and therefore that we should look first to external causal mechanisms to explain important changes in House organizational patterns. Rather, it is our goal to extend and clarify Price's theoretical speculations on professionalism in the House by proposing a simple behavioral model that better predicts the timing of the shift toward professionalization.

We are not the first to critique the behavioral implications of the mid-1890s realignment. Indeed, Polsby's

[9] Price ascribes this explanation to Polsby, Gallaher, and Rundquist, as well (Price 1971, 17).

[10] As Polsby puts it, "In part, it was Speaker Cannon's increasing use of [his appointment power] in an attempt to keep control of his fragmenting party that triggered the revolt ... and that led to the establishment of the committee system as we know it today" (1968, 156). Polsby, Gallaher, and Rundquist themselves focus on whether or not would-be committee chairs whose seniority was violated received "compensation." They convincingly show that "uncompensated" violations on chair appointments all but disappear after the Cannon revolt. From this they infer the broader point about the installation of an "automatic" seniority system.

[11] On this question, Nardulli (1995) presents convincing support for 1896 as a "critical moment" in presidential elections, based on an extensive analysis of local election returns.

own work includes one effort to reject the supposed realignment as a causal factor in the 1910 revolt against Speaker Cannon (Budgor et al. 1981). Some scholars go so far as to reject the realignment label altogether for the 1890s, at least as far as observable behaviors in Congress are concerned (see, e.g., Poole and Rosenthal 1993). On the other hand, Brady (1980) employs comparisons between committee assignments in the Fifty-Fifth House (elected 1896) and the preceding Fifty-Fourth (1894) and Fifty-Third (1892) Houses to argue in favor of 1896 as a realigning election.[12] There appears to be sufficient scholarly weight in favor of the 1896 date to justify our stylization for the purposes of providing a clear alternative hypothesis to our own explanation of changes in committee tenure patterns.

We shall now examine more closely the empirical evidence on committee tenure patterns by modeling and testing these two alternative hypotheses about the timing of the adoption of a seniority norm, against our hypothesis, extending the Price and Polsby-Gallaher-Rundquist analyses of committee leadership selection to consider tenure probabilities for all incumbent members of Congress. We argue that our hypothesis, grounded as it is in a change in electoral incentives, better explains the data and further points the way to a new explanation of other changes in House Rules left unexplained or accounted for in an ad hoc fashion by the Price and Polsby-Gallaher-Rundquist models.

DATA ANALYSIS

The central empirical implication of our approach is that committee tenure should rise after the widespread adoption of the Australian ballot. In order to test this claim, we need to build a statistical model of the length of time a member stays on a given committee assignment and see if there is a significant change after the ballot reforms. In particular, we predict a significant upward shift in committee tenure as personal vote opportunities become more worthwhile to the member.

There are three general characteristics of the committee tenure data that make it somewhat difficult to model, however. First, we note that it is integer-valued—that is, our data set is coded in such a way that a member serves one term, two terms, and so on. Thus, a model that predicted a stay on a committee of, say, 1.7 terms would imply that we know more about tenure than we in fact know. The second characteristic of the data is that we expect it to display "duration dependence." If our expectations about committee tenure are correct, then each additional term on a given committee represents an investment in the member of Congress's personal brand name. Over time, the member will be less interested in transferring away from a given assignment, all else equal, because giving up an assignment means he would lose the accumulated investment. Thus, a member who has been on a committee for five terms should be less likely to give up his assignment than would a freshman member, all else equal. In effect, we would like our model to weight the other determinants of committee exit by a member's length of prior service on the committee.

The last problem modeling the data is that the observed data are censored: as noted, our data set only includes surviving members. We do not get to observe the counterfactual—what would have happened to committee assignments had another incumbent retained his seat, rather than getting booted out of office. It is well known that House turnover rates declined significantly during the late nineteenth century (Fiorina, Rohde, and Wissel 1975). This potentially introduces a time-dependency problem as well. Later-elected members of Congress are more likely to win reelection; turnover per se probably affects the stability of committee assignments. While this turnover effect is important (as was pointed out by Price), it does not speak to the question we wish to answer: Does individual member of Congress behavior change after ballot reforms?

One approach to this problem could have been to focus on panel data, that is, to follow a "class" elected in a particular year throughout its members' lives. This was the approach used by Budgor and his colleagues (1981) to argue that the realignment of 1896 was not a significant cause of the revolt against Cannon in 1910. However, focusing on only a single "class" at a time would prevent us from making full use of the information available in the committee assignment data. What we would really like to do, in effect, is to incorporate observations on all of the respective "classes" that are present in a given House into a single model.

The class of models used to solve these three problems (referred to as *duration models*) is widely applied in labor economics to study employment patterns (for a general review, see Kiefer 1988). The primary choice we must make is whether to model the distribution of durations directly (as is suggested in King et al. 1990) using some discrete distribution or, instead, to model the conditional probabilities of leaving a committee at the end of a term. Such conditional probabilities are referred to as "hazard rates" in the duration literature.

Both the distribution of durations and the hazard rate contain the same information (as is shown in the appendix), so we must make this modeling choice based on other criteria. King and his colleagues might argue that because our predictions are about average durations, we should model the central tendency in durations directly, for example, $E(Y_i) = \exp(X_i\beta)$.

By doing so, however, we would sacrifice the ability easily to include time-varying covariates. King and his colleagues' goal in modeling cabinet durations was to determine what ex ante factors lead governments to last, such as investiture rules. Hence, excluding time-varying covariates was not a problem. In our case, however, time-varying covariates are particularly important be-

[12] Brady presents membership turnover on 13 House committees in 1896 as supporting evidence for that election as realigning. In every case, turnover in the Fifty-Fifth Congress compared to membership in the Fifty-Fourth exceeded 50% and reached 100% for 10 of the 26 party-contingents on the 13 committees. In contrast, turnover in the Fifty-Third Congress averaged just over 30%. Because Brady wanted to present evidence relating to the validity of 1896 as a realigning election, he did not restrict his analysis to only returning members of Congress. Hence, his results commingle members *transferred* from committee to committee with members of Congress not reelected.

cause the hypothesis we wish to test is whether or not tenure patterns changed after a particular date. We also need to account explicitly for such things as turnover in congressional membership, which affects all the returning members of that Congress. Finally, we lose little in the way of intuition by using the hazard rate. Our prediction in terms of hazard rates is that after the ballot reforms, the conditional probability of a member giving up an assignment decreases (he becomes less likely to transfer off the committee, all else constant). This is equivalent to assuming that the expected length of tenure increases after the ballot reforms.

Thus we need to build a model similar to more common binary choice models (e.g., logit or probit) in which we want to infer an underlying probability for a series of binary outcomes: Either the member did or did not give up his assignment in a given term on a committee (ignoring for the moment any problems due to censoring). As with other binary choice problems, a linear model generally does not work well because the probabilities must lie between zero and one. We therefore adopt a proportional hazard model commonly used to model duration data to test our claims.[13] The basic model is

$$\lambda(t, X, \beta) = \lambda_0(t)\exp(X_t \times \beta), \qquad (1)$$

where $\lambda(t, X, \beta)$ is the probability of leaving a committee in committee-term-of-service t, given that the member has been on the committee for all terms prior to t and given a set of covariates X_t (that can change for each period of observation of a member of Congress on a committee) and parameters β; and $\lambda_0(t)$ is the "baseline" probability of leaving a committee when all covariates are zero, so that $\exp(\cdot)$ is one.[14]

We want to ask, Does this hazard rate as modeled in equation 1 decline after the reforms? We test this by including in X_t a dummy variable, *Reform*, which indicates whether a Congress was before or after the cut point we have identified as signaling the general adoption of Australian ballot.[15] Our test then boils down to asking: Is the coefficient β_1 on the variable *Reform* significantly negative? If β_1 were negative then $\exp(Reform \times \beta_1)$ would be less than one, so that the probability after the reform would be some fraction of the baseline probability. This is true regardless of the initial value of the baseline hazard for a given term.

This analysis is contingent on the assumption that the only relevant change affecting the hazard rate is ballot reform. But the alternative hypotheses suggest otherwise. Thus we want also to test the institutionalization and realignment hypotheses that there should be changes in the hazard rate after the Cannon revolt of 1910 or after the reelection of 1896, respectively. We therefore augmented equation 1 to include a dummy variable equal to one for all post-1896 Congresses and a dummy variable equal to one for all post-1911 Congresses, similar to the reform variable already in the model. Again, according to both of these alternative theories, the coefficients on these dummy variables should be negative, indicating a decline in the probability a member gives up an assignment.

We also need to control for other factors that should systematically alter the hazard rate. Recall that our goal essentially is to combine Budgor and his colleagues' "cohort" or "class" approach with a duration model—that is, we want to plug into the equation the relevant information about congressional classes, even though our duration data are organized by "spells" of committee service and the hazard function is written to talk about spells. Drawing on Price's critique of Polsby, Gallaher, and Rundquist, we included a control for turnover. Turnover in our model represents the opportunities a member has to change a committee assignment, because the fewer returning members there are, the more committee slots there are to be filled. A similar logic also requires us to include a dummy variable for change in partisan control of the House, because changing party control leads also to changes in the committee ratios between parties. This gives members of the new majority party possible assignment opportunities above and beyond the effects of turnover. Given this logic, both increased turnover and a change in partisan control should increase the likelihood that a member gives up his assignment.

Decreasing turnover may have other effects that are not picked up by the simple turnover variable. Lower chamber turnover, of course, implies longer average careers in the House, which may have its own effect on committee assignments. To account for this possibility, we also included a control variable for seniority in the House—the cumulative terms served by member i as of time t. We expected, consistent with Price's interpretation, that as members settle into careers in the House, they become less likely to change their committee assignments, all else constant. Thus we expect the sign on this variable to be negative: higher service in the House leads to a lower probability of losing a given assignment.

We also include a dummy variable indicating whether the committee assignment is to one of three privileged committees: Appropriations, Rules, or Ways and Means. This draws on the work that shows that some committees are more desirable than others (Munger 1988; Stewart 1992b). If there are in fact "more desirable" committee assignments, for whatever reason, members should loathe giving them up. We lack a good theoretical model

[13] We do not use a logit or probit, because these, while satisfying the constraint of producing probabilities, imply a rather odd duration dependence. For details of the difference between the logit, probit, and other duration models, see Sueyoshi 1991.

[14] The baseline hazard rates $\lambda_0(t)$ can be modeled in a number of ways. We essentially model it as a term-specific dummy variable—referred to as a *semiparametric duration model*. Alternatives include parametric restrictions, which lead naturally to the Gompertz or Weibull distributions common in the duration literature. We tested these possible restrictions via a likelihood ratio test and rejected them. However, even under these restrictions, our qualitative results did not change.

[15] Note that for a member who is on a committee both before and after the reforms, this dummy variable changes from a zero to a one for all committee terms that occur after the reforms. Hence, the model says that ceteris paribus, this member would be more/less likely to give up the same assignment after the reforms. Hence, we do not have to partition the data set into individuals who entered before and after the reforms. We allow for members who bridge the reforms to change their behavior.

for distinguishing what these desirable committees might be, but a defensible approximation should be to distinguish those committees that are defined by the House rules to have privileged access to the floor.[16] Finally, we included a control for party membership. We had no particular expectation for the effect this variable would have, but we note that committee assignments are handled at the level of the party caucus, so that there might be systematic, idiosyncratic differences in tenure patterns between the two parties that our model cannot otherwise pick up. The variable, *Democrat*, is coded as one if the member is a Democrat and zero otherwise.

We estimate this fully specified model using data for all standing committee assignments excluding third-party members from 1874 to 1928.[17] The unit of observation is member/committee assignment/committee term. So a member who is on two committees for three terms per committee contributes a total of six observations to the estimation. Hence, in our data set there are only 3,411 individual members of Congress but a total of 20,007 observations. This may seem confusing at first, but recall that the model is really estimating the conditional probability that a member leaves a committee *assignment* in a given term of committee service (i.e., conditional on having served some previous number of terms on the committee). So multiple observations of a member on a committee give new information: The member's first year gives us information about the probability that a member in his first term will give up an assignment, the observation of his second term on the committee gives us information about his giving up a committee assignment after two terms, and so on.[18] Also note that we have progressively less information about the latter terms as members either leave Congress or give up their committee assignment. We have 11,555 observations of members in their first term of committee service (57.8% of the sample), 4,141 in their second term (20.7%), 1,958 in their third term (9.8%), 1,062 in their fourth term (5.3%), 576 in their fifth term (2.9%), 344 in their sixth term (1.7%), 182 in their seventh term (.9%), 98 in their eighth term (.5%), and only 59 in their ninth term of committee service (.3%). We should therefore be cautious of the inferences we draw about behavior of these very senior members. The details of the estimation are discussed in the appendix.

TABLE 2. Semiparametric Proportional Hazard Model of Committee Tenure, 1874–1928

Explanatory Variable	Parameter
Cumulative terms in house	−.017
	(.005)
Percent returned	.208
	(.136)
Change in party control	.080
	(.028)
Democrat	.081
	(.018)
Privileged committee	−.246
	(.023)
Realignment	.053
	(.043)
Revolt	−.028
	(.023)
Australian ballot reform	−.280
	(.035)
Baseline integrated hazards	
1st committee term	.081
	(.030)
2d committee term	.258
	(.033)
3d committee term	.355
	(.040)
4th committee term	.509
	(.050)
5th committee term	.501
	(.064)
6th committee term	.359
	(.077)
7th committee term	.324
	(.102)
8th committee term	.810
	(.168)
9th committee term	.547
	(.188)

Note: Entries are maximum likelihood estimates. Asymptotic standard errors appear in parentheses. N = 20007. Log likelihood = −10389.737.

The results are found in Table 2. Our primary concern is the ballot reform dummy. As expected, it is significant and negative—evidence in support of our model. The results for realignment and the Cannon revolt are less impressive. The coefficient on the realignment dummy was positive, contrary to the realignment hypothesis, although the result was not statistically significant. The institutionalization hypothesis fared a little better, in that the sign of the revolt coefficient is in the correct direction. However, it too is statistically indistinguishable from zero.

While the results of these statistical hypothesis tests provide important support for our main hypothesis, it is hard, given the nonlinear form of the model, to see the effect of the ballot reform on the probability of giving up

[16] These three substantive committees enjoyed privileged status throughout our study period. A number of other committees (which we did not code as "privileged") also enjoyed a measure of floor privileges off and on during the postbellum period, including the committees on Elections, Public Lands, Rivers and Harbors, Territories, Enrolled Bills, Invalid Pensions, Printing, Accounts, and the various committees with appropriations duties in addition to the Appropriations Committee itself.

[17] Data on committee assignments were originally collected by Garrison Nelson. The data were checked and then merged with the ICPSR Congressional Biography database in order to find out a member's party, cumulative terms in the House, and whether the member returned in the following Congress (i.e., Was the observation censored?).

[18] We are in fact ignoring some information in the sample. Because we get to observe many of our *members* multiple times we could in theory estimate individually based random effects (i.e., the most extreme form of heterogeneity). However, in practice these updated estimates are problematic and can lead to mistaken inferences (Heckman and Singer 1984).

TABLE 3. Probability of Giving up Committee Assignment

Committee Term	Before Ballot Reform	After Ballot Reform
1st	.662	.559
2d	.726	.624
3d	.760	.660
4th	.811	.716
5th	.808	.713
6th	.761	.661
7th	.749	.648
8th	.894	.817
9th	.822	.729

Note: Probabilities are calculated by holding all covariates at their mean.

a given committee assignment. In order better to explore this effect, in Table 1 we calculated for a hypothetical member the probability that he gives up his assignment, both before and after the ballot reforms. Our hypothetical member of Congress has attributes set to their mean levels (all continuous covariates are measured as differences from mean, so they are zero when the mean value is attained) and all dummy variables are set to zero. In other words, this member of Congress would be a Republican member of a nonprivileged committee in a term that saw no change in party control of the chamber and whose chamber service was at the mean for the 1874–1928 period. From Table 3 we see that after the reforms our "typical" member about to begin his second term on a committee was almost 10% less likely to give up that assignment in the next Congress than he would have been before the ballot changes. A similar pattern holds for the other terms after the ballot reforms.[19]

CONCLUSION

In *The Personal Vote*, Cain, Ferejohn, and Fiorina wrote that "to understand legislative policy making, one must understand the electoral relationship between representatives and their constituents. . . . The nature of voter response is a critical variable, and voter response *is* a variable, not something etched in stone at the inception of a political system" (1987, 212). Students of Congress have long noted differences between the way things used to be in the responsible party government days of yore in the House, on the one hand, and the personalistic, "Why don't we do it on the floor" House of recent years. Few scholarly efforts, however, have sought to provide systematic explanations for how the nineteenth-century House transformed into the modern House. We have proposed a first step toward such an explanation, in which we take Cain, Ferejohn, and Fiorina's emphasis on the electoral connection to heart.

We have argued that most of the widely accepted models of the modern Congress begin with the reelection incentive and that this incentive itself reflects the formal structure of the electoral rules chosen by the states. The point of the reelection incentive assumption for understanding Congress, of course, is that member motivations in turn affect how members of Congress behave within Congress. Holding constant the rules and structures employed by the House, we expect members of Congress to allocate their limited time and energy optimally to secure reelection. The "seniority system" of tenure rights to committee assignments fits quite well with a reelection-oriented perspective on legislative organization. Only a member of Congress who believed he could affect his chances of reelection would invest heavily in credit-claiming human capital, such as a reputation for expertise in a particular policy arena. Hence, if the committee assignment process is sensitive to such investments, a change in electoral rules that raises the average level of investment in expertise should produce as well an increase in the average rate of reappointment.

In our view, then, tenure rights for reelection-minded members of Congress within a division-of-labor committee system makes sense both for members of Congress and for their parties. Members trying to get reelected will work harder at climbing the learning curve toward being experts on policies and policy implementation when they believe those skills will continue to serve them in future terms of office. Individual committee members in the pursuit of credit-claiming opportunities will be motivated both to seek out problems and solutions, and to publicize their findings.

We have argued that the development of the modern House in the late nineteenth century can best be accounted for in a model that explicitly considers the electoral motives of members of Congress. Congressional organizations are a matter of choice for incumbent members of Congress; they tend to reflect the forces that drive members' interests and incentives. Thus, events that alter the value of various electoral strategies, such as changes in electoral laws, should have predictable effects on House organizations. Australian ballot electoral laws at the state level provided the necessary conditions for modern, "personal vote" coalition-building activities in the House.

APPENDIX

We shall derive in some detail the statistical model used to test our claims about changes in committee tenure patterns discussed in the text.[20] Since hazard models are not so commonly used in political science, we first show the relationship between

[19] The careful reader will note that the hazard rates in Table 2 actually increase somewhat in committee terms 8 and 9, contrary to our (implicit) hypothesis of negative duration dependence, which follows from an "expertise-driven" explanation of lengthening tenure. As we noted, these estimates are based on relatively few observations (only 59 observations of members of Congress reaching their ninth term on a given committee). At the same time, we have little reason to believe that the "experience-driven" negative duration dependence should persist as the number of terms served gets large. Some of these more senior members may shift from committee positions into party leadership positions, for example. In other cases, very senior members may be stripped of their authority by a "changing of the guard" in party leadership or in recognition of the member's declining vitality (as the member, presumably, enters old age). But these stories all lie outside of the main purpose of our model, which is to investigate the systemic effects of ballot reforms on tenure.

[20] The discussion in the appendix is based on Sueyoshi 1991 and Kiefer 1988, which provide greater detail.

the hazard function and the distribution of duration times, which is normally used to generate a maximum likelihood model. We then use the hazard model to generate a likelihood function and show how the hazard model specified can be thought of as an unusual binary choice model, which aides in both estimation and interpretation. Finally, we turn to specifying the functional form of the hazard model in the text.

Our goal is to develop a statistical model of how long a member of Congress remains on a committee, taking into account possible right-censoring due to failure to be returned to Congress. Using standard econometric practice we would just specify either the conditional density $f(t|X,\theta)$ or distribution $F(t|X,\theta)$ and maximize the resulting likelihood function. However, it is often easier with grouped duration data such as the committee tenure data to specify instead the hazard rate—that is, the probability that an individual in the sample gives up his assignment in period t. We are able to specify the model in terms of the hazard rate because it completely determines the stochastic process.

We define the hazard function, ignoring covariates for the moment, as

$$\lambda(t) = \frac{f(t)}{1 - F(t)} = \frac{f(t)}{S(t)}, \qquad \textbf{(A-1)}$$

where $F(t)$ is the cumulative distribution of the durations, $f(t)$ is its associated density, and $S(t)$ is the survivor function—that is, the probability that the duration T is greater than t. Since $f(t)=F'(t)$, equation A-1 sets up an implicit differential equation that we can use to solve for S(t):

$$S(t) = \exp\left(-\int_0^t \lambda(s)ds \right). \qquad \textbf{(A-2)}$$

We therefore see that the density (and, of course, the cumulative distribution) can be expressed entirely in terms of the hazard function $\lambda(t)$ from equations A-1 and A-2:

$$f(t) = \lambda(t)S(t) = \lambda(t)\exp\left(-\int_0^t \lambda(s)ds \right). \qquad \textbf{(A-3)}$$

This implies that we can write the likelihood using the hazard function.

Before we can derive the likelihood function, we need to provide some more definitions and notation. We will first need to define $f(t)$ not in terms of $S(t)$ but instead in terms of the conditional survival function. Consider any two durations t_k and t_{k-1} ordered by their subscripts ($t_{k-1} < t_k$). We may define the conditional survivor function as

$$S(t_k|T > t_{k-1}) = Pr(T \geq t_k|T > t_{k-1}) = \exp\left(-\int_{t_{k-1}}^{t_k} \lambda(s)ds \right).$$

Then

$$f(t_k) = \lambda(t_k)\prod_{j=1}^{k} S(t_j|T > t_{j-1}),$$

because $S(t_k) = \prod_{j=1}^{k} S(t_j|T > t_{j-1})$; $t_0 = 0$.

We also need to extend the basic notation and results to the more general hazard function $\lambda(t, X, \theta)$, which allows for a parameterized influence of a set of covariates X given a set of parameters θ. Using this new notation we can redefine the conditional survivor function as

$$S(t_k, X, \beta|T > t_{k-1}) = \alpha_k(X, \theta) = \exp\left(-\int_{t_{k-1}}^{t_k} \lambda(s)ds \right) \qquad \textbf{(A-4)}$$

where $\alpha_k(X, \theta)$ represents the exponential of the k_{th} integrated hazard segment from t_{k-1} to t_k.

Turning to the problem of formulating the likelihood function, two possible cases will arise in the data. In the case where the failure time is not right-censored and is observed to occur at period t, all that is known is that the individual had not failed (i.e., left the committee) at the beginning of period $t - 1$ but has failed by the beginning of period t. Alternatively, given right-censoring at period t, all that is known is that the underlying duration exceeds $t - 1$. The probabilities associated with these two events (and hence their contribution to the likelihood) can be expressed in terms of the underlying hazards and integrated hazard segments:

$$Pr(t_{k-1} \leq T \leq t_k) = \int_{t_{k-1}}^{t_k} \lambda(s, X, \theta)S(s, X, \theta)ds = (1 - \alpha_k(X,\theta)) \prod_{j=1}^{k-1} \alpha_j(X, \theta)$$

$$Pr(T \geq t_{k-1}) = \int_{t_{k-1}}^{\infty} \lambda(s, X, \theta)S(s, X, \theta)ds = \prod_{j=1}^{k-1} \alpha_j(X, \theta).$$

Given these two probabilities, we are in a position to define the likelihood function for the grouped duration data. If individual i's duration takes the from (t_i, c_i), where t_i is the individual observed duration and c_i is a censoring indicator that takes on the value of one if the observation is censored and zero otherwise, then the likelihood function for the N individuals in the sample is

$$L(\theta) = \prod_{i=1}^{N} \left\{ (1 - \alpha_{t_i}(X_i, \theta))^{1-c_i} \prod_{j=1}^{t_1-1} \alpha_j(X_i, \theta) \right\}. \qquad \textbf{(A-5)}$$

The common approach to estimation then would be to specify a functional form for $\lambda(\cdot)$ (and therefore $\alpha(\cdot)$) and maximize the log likelihood function given the observed data. We will come back to the choice of functional form for the hazard function.

In order to simplify the estimation of equation A-5, we need to consider the relationship of hazard models to other discrete choice models. We can think of an individual observation as a series of binary choices in each period: Individual i either survived or failed in each period. In terms of the likelihood function in equation A-5, each individual contributes $t_i - c_i$ nonidentical Bernoulli trials to the likelihood, where the success probabilities are given by a period-specific function for the probability of surviving to the subsequent period (Kiefer 1988).

In order to estimate the durations on committees as a series of binary choices, we need to construct a synthetic data set, with each period-individual survival as the unit of observation. Let the total number of observations in this synthetic data set be $\tilde{N} = \Sigma_i (t_i - c_i)$. We index these observations by n, define the indicator d_n, which takes on the value of one if the

individual survives the interval and zero otherwise, and the time indicator t_n, which gives the time period with the interval associated with observation n. We can then write the equivalent likelihood function:

$$\tilde{L}(\theta) = \prod_{n=1}^{\tilde{N}} \alpha_{t_n}(X,\ \theta)^{d_n}(1 - \alpha_{t_n}(X,\ \theta))^{1-d_n}. \qquad \textbf{(A-6)}$$

This likelihood is strikingly similar to the standard binary choice models, except that the usual cumulative distribution (either the normal for probit or logistic for logit models) is replaced by $\alpha(\cdot)$, which depends on the integrated hazard components.

The only issue left to resolve in order to estimate the model is a specification of $\lambda(t, X, \theta)$. We choose to restrict our specification to the family of Cox (1972) proportional hazards defined as

$$\lambda(t, X, \theta) = \lambda_0(t) \exp(X\beta),$$

where $\lambda_0(t)$ is the baseline hazard that characterizes the dependence of the hazard upon time, which may depend on additional parameters, so that θ contains both β and the additional shape parameters. The specification derives its name from the fact that the explanatory variables alter the hazard proportionately, by scaling the baseline hazard up or down by a constant factor.

Although we have specified $\lambda(\cdot)$, our likelihood is written in terms of the α_k; so we must derive it. We do this by substituting our choice of $\lambda(\cdot)$ into the definition of α_k. This yields

$$\alpha_k(X, \theta) = \exp\left(-\int_{t_{k-1}}^{t_k} \lambda_0(s) \exp(X\beta) ds \right)$$

$$= \exp(-\exp(\gamma_k + X\beta)), \qquad \textbf{(A-7)}$$

where

$$\gamma_k = \log \int_{t_{k-1}}^{t_k} \lambda_0(s) ds.$$

Hence, the γ_k embeds the nature of the duration dependence of the process.

Much of the econometric literature on proportional hazards has focused on specifying a parametric functional form for $\lambda_0(t)$, which places between-period restrictions on the γ_k. In our case, because we have no theoretical justification for restriction on the duration dependence, we estimate the γ_k's directly as period-specific constants—an approach referred to as *semiparametric* in the literature. We can thus estimate our model using a binary response model in which the probability of surviving an interval is given by $\exp(-\exp(\gamma_k + X\beta))$.

There are two advantages to likelihood function defined by equations A-6 and A-7. First, we do not need to restrict the duration dependence as is required by the parametric approaches. This is important in our application because, as noted, we have no theoretical basis upon which to place such restrictions. Second—and more important—this binary choice model of the duration is straightforward to compute. All that is needed to evaluate the likelihood is the ability to estimate nonlinear regression models. We estimated our model by first estimating the appropriate nonlinear regression using fixed weights. We then used these estimates as initial values to take one Newton-Raphson step in the direction of maximum likelihood.[21] This one-step estimator will achieve first-order efficiency and will offer considerable computational saving over a fully interactive estimation of equation A-5.

[21] SAS code for this procedure is available upon request from the authors.

REFERENCES

Abram, Michael, and Joseph Cooper. 1968. "The Rise of Seniority in the House of Representatives." *Polity* 1:53–85.

Albright, Spencer D. 1942. *The American Ballot*. Washington: American Council on Public Affairs.

Aldrich, John H. 1995. *Why Parties? The Origin and Transformation of Party Politics in America*. Chicago: University of Chicago Press.

Alexander, DeAlva S. 1916. *History and Procedure of the House of Representatives*. Boston: Houghton Mifflin.

Brady, David W. 1973. *Congressional Voting in a Partisan Era: A Study of the McKinley Houses and a Comparison to the Modern House of Representatives*. Lawrence: University Press of Kansas.

Brady, David W. 1980. "Elections, Congress, and Public Policy Changes: 1886–1960." In *Realignment in American Politics*, ed. Bruce A. Campbell and Richard J. Trilling. Austin: University of Texas Press.

Brady, David W., Joseph Cooper, and Patricia A. Hurley. 1979. "The Decline of Party in the U.S. House of Representatives, 1887–1968." *Legislative Studies Quarterly* 4:381–407.

Budgor, Joel, Elizabeth Capell, David Flanders, Nelson Polsby, Mark Westlye, and John Zaller. 1981. "The 1896 Election and Congressional Modernization." *Social Science History* 5:53–90.

Cain, Bruce, John Ferejohn, and Morris Fiorina. 1987. *The Personal Vote: Constituency Service and Electoral Independence*. Cambridge: Harvard University Press.

Campbell, Bruce A., and Richard J. Trilling, eds. 1980. *Realignment in American Politics: Toward a Theory*. Austin: University of Texas Press.

Carmines, Edward G., and James A. Stimson. 1989. *Issue Evolution: Race and the Transformation of American Politics*. Princeton: Princeton University Press.

Cox, Gary W., and Mathew D. McCubbins. 1993. *Legislative Leviathan: Party Government in the House*. Berkeley: University of California Press.

Evans, Eldon C. 1917. *A History of the Australian Ballot System in the United States*. Chicago: University of Chicago Press.

Fenno, Richard F. 1978. *Home Style: House Members and Their Districts*. Glenview, IL: Scott, Foresman.

Fiorina, Morris P. 1977. *Congress: Keystone of the Washington Establishment*. New Haven: Yale University Press.

Fiorina, Morris P., David Rohde, and Peter Wissel. 1975. "Historical Change in House Turnover." In Norman J. Ornstein, ed., *Congress in Change: Evolution and Reform*. New York: Praeger.

Follett, Mary Parker. 1896. *The Speaker of the House of Representatives*. New York: Longman's, Green.

Fredman, L. E. 1968. *The Australian Ballot: The Story of an American Reform*. East Lansing: Michigan State University Press.

Galloway, George, and Sidney Wise. 1976. *History of the House of Representatives*. 2d ed. New York: Crowell.

Goodwin, George. 1959. "The Seniority System in Congress." *American Political Science Review* 53:412–36.

Goodwin, George. 1970. *The Little Legislatures: Committees of Congress*. Amherst: University of Massachusetts Press.

Heckman, James, and Burton Singer. 1984. "A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data." *Econometrica* 51:271–320.

Jones, Charles O. 1968. "Joseph G. Cannon and Howard W. Smith: An Essay on the Limits of Leadership in the House of Representatives." *Journal of Politics* 30:617–46.

Kernell, Samuel. 1977. "Toward Understanding Nineteenth-Century Congressional Careers: Ambition, Competition, and Rotation." *American Journal of Political Science* 21:669–93.

Kiefer, Nicholas M. 1988. "Economic Duration Data and Hazard Functions." *Journal of Economic Literature* 26:646–79.

King, Gary, James Alt, Nancy Burns, and Michael Laver. 1990. "A Unified Model of Cabinet Dissolution in Parliamentary Democracies." *American Journal of Political Science* 34:846–71.

Kousser, J. Morgan. 1974. *The Shaping of Southern Politics: Suffrage Restrictions and the Establishment of the One-Party South, 1880–1910*. New Haven: Yale University Press.

Ludington, Arthur C. 1911. *American Ballot Laws, 1888–1910*. New

York State Education Department Bulletin No. 448. University of the State of New York, Albany.
McConachie, Lauros. 1973. *Congressional Committees*. New York: Franklin Reprints.
Martis, Kenneth. 1980. *The Historical Atlas of Political Parties in the United States Congress, 1789–1989*. New York: Macmillan.
Mayer, George H. 1967. *The Republican Party, 1854–1966*. 2d ed. New York: Oxford University Press.
Mayhew, David R. 1974. *Congress: The Electoral Connection*. New Haven: Yale University Press.
Morgan, H. Wayne. 1969. *From Hayes to McKinley: National Party Politics, 1877–1896*. Syracuse, NY: Syracuse University Press.
Munger, Michael C. 1988. "Allocation of Desirable Committee Assignments: Extended Queues Versus Committee Expansion." *American Journal of Political Science* 32:317–44.
Nardulli, Peter. 1995. "The Concept of a Critical Realignment, Electoral Behavior, and Political Change." *American Political Science Review* 89:10–22.
Petrocik, John R. 1991. "The Republican Presidential Advantage in the Age of Party Disunity." In Gary W. Cox and Samuel Kernell, eds. *The Politics of Divided Government*. Boulder: Westview.
Polsby, Nelson W. 1968. "The Institutionalization of the U.S. House of Representatives." *American Political Science Review* 62:144–68.
Polsby, Nelson W., Miriam Gallaher, and Barry S. Rundquist. 1969. "The Growth of the Seniority System in the U.S. House of Representatives." *American Political Science Review* 63:787–807.
Poole, Keith T., and Howard Rosenthal. 1993. "Spatial Realignment and the Mapping of Issues in American History: The Evidence from Roll Call Voting." In William Riker, ed., *Agenda Formation*. Ann Arbor: University of Michigan Press.
Price, H. Douglas. 1971. "The Congressional Career—Then and Now." In *Congressional Behavior*, ed. Nelson W. Polsby. New York: Random House.
Price, H. Douglas. 1975. "Congress and the Evolution of Legislative 'Professionalism'." In *Congress in Change*, ed. Norman J. Ornstein. New York: Praeger.
Price, H. Douglas. 1977. "Careers and Committees in the American Congress: The Problem of Structural Change." In *The History of Parliamentary Behavior*, ed. William Aydelotte. Princeton: Princeton University Press.
Rusk, Jerrold. 1970. "The Effect of the Australian Ballot Reform on Split Ticket Voting: 1876–1908." *American Political Science Review* 64:1220–38.
Stewart, Charles H. III. 1992a. "The Growth of the Committee System, from Randall to Gillett." In *The Atomistic Congress*, ed. Allen D. Hertzke and Ronald M. Peters Jr. Armonk, NY: Sharpe.
Stewart, Charles H. III. 1992b. "Committee Hierarchies in the Modernizing House, 1875–1947." *American Journal of Political Science* 36:835–56.
Sueyoshi, Glen T. 1991. "A Class of Binary Response Models for Grouped Duration Data." University of California, San Diego. Mimeo.