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Source: *Journal of Law, Economics, & Organization*, Vol. 3, No. 2 (Autumn, 1987), pp. 287-335

Published by: Oxford University Press

Stable URL: <http://www.jstor.org/stable/764831>

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Collective Decisionmaking and Standing Committees: An Informational Rationale for Restrictive Amendment Procedures

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INTRODUCTION

Specialization is a predominant feature of informed decisionmaking in collective bodies. Alternatives are often initially evaluated by standing committees comprised of subsets of the membership. Committee members may have prior knowledge about policies in the committee's jurisdiction or may develop expertise on an ongoing basis. Specialization by committees can be an efficient way for the parent body to obtain costly information about the consequences of alternative policies. Indeed, some scholars have argued persuasively that acquisition of information is the *raison d'être* for legislative committees (Cooper).

In most collective decisionmaking bodies, the relationship between a committee and the parent body is governed by a complex array of procedures. A common feature of such procedures is that they restrict the ability of the parent body to amend committee proposals. In the U. S. House of Representatives, for example, the capacity for employing restrictive amendment procedures accelerated abruptly in the late nineteenth century. The Speaker sometimes used his powers of recognition to suppress amendments to committee proposals. The standing rules of the House were often suspended

Helpful comments were provided by Dave Baron, Jon Bendor, Kim Border, Morris Fiorina, Ken Koford, Doug Rivers, Larry Rothenberg, Martin Shapiro, Barry Weingast, Jack Wright, and participants at the Columbia University Symposium on the Law and Economics of Procedure, the Caltech Brown Bag Seminar, and the School of Business at the University of Southern California. Part of this research was supported by NSF grant no. 23-638973.

Journal of Law, Economics, and Organization vol. 3, no. 2 Fall 1987
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temporarily and replaced by a procedure that precluded amendments to committee proposals. And the regular order of business was often set aside via special orders that specified precise, and often restrictive, conditions under which committee proposals could be debated and amended. These and other forms of restrictive procedures are frequently employed in contemporary legislatures as well.

The prevalence of procedures that restrict the ability of the parent body to amend its committees' proposals is puzzling because the procedures themselves are normally subject to parent body approval. For example, article I, section 5 of the U.S. Constitution states that "each House may determine the rules of its proceedings," and the exercise of this right is theoretically subject to simple majority rule. Why, then, would the parent body agree to procedures that may ultimately restrict its ability to amend committee proposals? Why and under what conditions would a majority commit to a process that appears to limit its influence on legislative policy?

The thesis of this paper is that restrictions on the ability of a parent body to amend committee proposals can enhance the *informational role of committees*. More precisely, restrictive procedures can encourage committees to gather information and can facilitate the adoption of informed policies that are jointly beneficial to the committee and parent body. Thus, acting in its self-interest, the parent body often restricts its ability to amend committee proposals.

The motivation for studying restrictive procedures in light of the informational role of committees comes from studies of congressional decision-making that stress the informational advantage gained by expert committees over their parent body (Cooper; Fenno, 1966; MacNeil). Committees that possess expertise about the consequences of alternative policies within their jurisdiction often have an incentive to use their special information strategically. In his study of the House Appropriations Committee, for example, Fenno writes that "subcommittee specialists have a more informed understanding of the subject matter than anyone else," and he quotes members who refer to chairmen's "vast storehouse of information" obtained from "digging out the facts" (1966:440-41). Yet it is evident that expertise can be a double-edged sword from the perspective of a parent body that is informationally disadvantaged. Fenno continues:

Not only is specialized knowledge a key norm of the House, but appropriations subcommittee chairmen are frequently found among those members with the most outstanding reputations for *expertise*. . . . Where this is true, their reputation constitutes a *strategic asset which can be manipulated on the floor* (emphasis added).

Specialization, then, can trigger an unfortunate sequence of actions. If committee members' preferences for a particular policy outcome differ from those of the parent body, the parent body's recognition of the incentives for strategic

use of expertise may cause it to reject or amend proposals of the committee. This behavior, however, undermines the incentive for the committee to specialize, because the committee realizes that its acquired expertise has little bearing on the adoption of the legislative policy. Ultimately, both the committee and the parent body may suffer. The committee is deprived of the opportunity to influence policy, and the parent body makes uninformed decisions. Thus, the benefits a parent body may derive in principle from specialization of its committees may not be attainable in practice. Specialization by committees is a *necessary* but *not sufficient* condition for informed collective decisionmaking.

This study employs a model to illustrate the effects of restrictive procedures in a collective decisionmaking body in which committees may specialize. Actors in the model initially are uncertain about the consequences of alternative policies but have common probabilistic beliefs about the relationship between policies and their consequences. Given this uncertainty, a committee and a parent body engage in a sequence of actions culminating in the selection of a policy. Parent body actions include selection of unrestrictive or restrictive procedures and selection of final policies. Committee actions include deciding whether or not to specialize and proposal of a bill to the parent body. Committee specialization is represented as the acquisition of information by the committee that reveals the exact consequences of policies prior to their adoption. The committee's decision of whether to specialize in this manner is observed by the parent body, but the actual information gained is initially known only to the committee. In equilibrium, the behavior of the committee and the parent body maximizes their expected utilities based on their beliefs about the likely consequences of the policy alternatives.

Theoretical results are first derived for two amendment procedures and then for the parent body's choice of procedure. In the *unrestrictive procedure*, P'' , the parent body may select any alternative to the committee's proposal. Sometimes called an open rule, this procedure characterizes many deliberative and democratic collective choice institutions. The unrestricted ability of the parent body to amend committee proposals under P'' often *undermines* informed decisionmaking by the parent body in two ways. First, a rational committee makes proposals that cause the parent body to make imprecise inferences about the relationship between policies and their consequences. Although this strategy maximizes the committee's ability to obtain outcomes it prefers, it frequently results in the adoption of a policy for which other alternatives are jointly beneficial to the parent body and the committee. Second, because only limited inferences are possible, the parent body often makes its final decisions under substantial uncertainty and the committee's expected rewards from specialization are minimal. Thus, the committee frequently chooses not to acquire information relevant for the policy process, even though such information would benefit the parent body.

The *restrictive procedure*, P^r , prohibits the parent body from amending the committee's proposal. Thus, its choice is between the proposal, as reported by the committee, and the status quo. This procedure is sometimes called a closed rule. The inability of the parent body to amend committee proposals under P^r often *enhances* the ability of the collective body to derive benefits from committee specialization. First, the parent body can make more precise inferences about the committee's private information and use the information in its selection of jointly beneficial policies. Second, because the committee has more influence on policy, it also has a greater incentive to obtain information. Thus, relative to P^u , P^r often enhances the informational role of committees in collective decisionmaking.

Restrictive procedures sometimes entail distributional benefits to the committee at the expense of the parent body. However, the informational benefits associated with restrictive procedures often offset the distributional losses to the parent body. Hence, the main result of the model: the parent body chooses to employ restrictive procedures for a wide range of the exogenous variables of the model. As long as the preferences of the committee and the parent body are not extremely divergent and the costs of committee specialization are not prohibitive, the parent body benefits from limiting its ability to amend committee proposals.

Although the focus of the paper is on procedural solutions to problems posed by decisionmaking under uncertainty, the model also has implications for other institutional devices for inducing specialization and informed decisionmaking. In some cases the informational role of committees can be enhanced by altering committee assignments rather than by restricting amendments. For example, under either amendment procedure, as the preferences of the committee and parent body converge, the committee becomes increasingly likely to acquire information that the parent body can use in its final policy selection. Similarly, lowering the cost the committee must incur to obtain expertise has the obvious effect of stimulating the gathering of information by the committee and the less obvious effect of stimulating the mutually beneficial use of information by the committee and the parent body.

Section 2 documents the development of restrictive procedures in the U. S. House of Representatives in the last several decades of the nineteenth century and poses the puzzle of why a collective decisionmaking body would adopt restrictive amendment procedures. Section 3 introduces a model of collective decisionmaking with standing committees in which actors are uncertain about the relationship between policies and their consequences. Section 4 contains an analysis of the properties of the model for unrestrictive amendment procedures, while section 5 examines the same model for restrictive procedures. Section 6 identifies the conditions under which restrictive procedures are preferred by the parent body, thus exposing the informational rationale for restrictive procedures. Section 7 is a discussion, and section 8 is a summary.

2. EXAMPLES OF RESTRICTIVE PROCEDURES: THE NINETEENTH-CENTURY CONGRESS

The House once debated; now it does not debate. It has not the time. There would be too many debates, and there are too many subjects to debate. It is a business body, and it must get its business done—Woodrow Wilson, *Constitutional Government in the United States*.

A historical analysis of the U.S. House of Representatives in the late nineteenth century illustrates several methods of restrictive amendment procedures and provides a concrete context in which to pose the institutional puzzle addressed here. Three classes of restrictive procedures are recognition precedents, suspension of the rules, and special orders reported by the Committee on Rules. Since approximately 1870, the House has exhibited the ability to commit to the selective use of these procedural arrangements.

2.1. RECOGNITION

For orderly conduct of business, any collective body needs procedures that govern who may make motions and when various types of motions are in order. Typically, the associated powers of recognition are vested in the presiding officer(s) of the body, for example, the Speaker of the House, the chairman of the Committee of the Whole, or the president pro tempore of the Senate.

Prior to the 1870s several recognition precedents were set, but few of them had major implications for restrictiveness of House procedure. The Speaker's power of recognition was initially prescribed by *Jefferson's Manual*, which governs House procedure whenever it does not conflict with the House's standing rules (Hinds:5, 6757).¹ The early standing rule on recognition seems to have been of minimal strategic significance,² but in the 1840s precedents began to establish more discriminating criteria for recognition. For example, preferential treatment to members of the reporting committee was granted by precedent as early as 1843 (Hinds: 69), and precedence of motions to be offered became a criterion for recognition by 1851 (Hinds: 2, 1422). At least until 1857, however, the Speaker's recognition decision was subject to appeal. Indeed, in most key recognition precedents the decision of the chair was appealed (Hinds: 65, 66, 69).

1. Citations to Hinds without a volume number refer to the 1899 edition, *Parliamentary Precedents of the House of Representatives in the United States*. Citations with a volume number refer to the five-volume set published in 1907. In each case, precedent numbers rather than page numbers are provided.

2. Section 2 of Rule XIV, adopted in the first session of the 1st Congress, stated that "when two or more Members rise at once, the Speaker shall name the Member who is first to speak" (Hinds: 61).

By the late 1870s concentration of recognition rights in the Speaker was well underway, and increasingly the Speaker used recognition powers to regulate the conduct of business. In 1879 the House accepted a Rules Committee report clarifying the Speaker's recognition powers. The report clearly indicates that recognition had come to be (and was accepted as being) a discretionary, hence potentially restrictive, tool.

Discretion must be lodged with the presiding officer, and no fixed and arbitrary order of recognition can be wisely provided for in advance. . . . The practice of making a list of those who desire to speak on measures . . . is a proper one to know and remember the wishes of Members. As to the order of recognition, he should not be bound to follow the list, but should be *free to exercise a wise and just discretion* in the interest of full and fair debate (Hinds: 63, emphasis added).

Recognition powers were further strengthened two years later when Speaker Randall declined appeal on the question of recognition, stating that "the right of recognition is just as absolute in the Chair as the judgment of the Supreme Court of the United States is to the interpretation of the law" (Hinds: 2, 1425). Speaker Keifer affirmed the new precedent in 1883 (Hinds: 2, 1426).

Throughout the 1880s and into the 1890s, recognition precedents increasingly favored bill-supporting committee majorities by restricting the opportunities for others to be recognized. An 1886 precedent gave preference to the supporter of a bill from the committee over that committee's chairman because the chairman opposed the bill (Hinds: 71). An 1889 precedent gave preference to the bill manager from the committee over other members who wished to make motions of greater privilege (Hinds: 74).³

By the turn of the century, recognition powers were not only well established but also explicitly used for control of business via *denying* recognition to members whose motions were not known to or not favored by the Speaker. By 1897 it was possible that "the Speaker may, under certain circumstances, prefer another Member to one who is already on the floor" (Hinds: 68).⁴ Evidence of the willingness of Speakers to use recognition precedents to restrict debate and amendments is provided by the Speakers themselves. In

3. This precedent was generalized in 1892 when Speaker Crisp ruled that "neither a motion to lay on the table nor a motion to adjourn or to take a recess, all of which are highly privileged motions, can take off the floor a gentleman who has the floor" (Hinds: 77). Historians often credit Speaker Reed for bringing an otherwise unruly House under control by "counting the quorum" in 1891 (W. Robinson: McCall). The twin irony is that (1) Reed raised and was overruled on this point of order which sought to undermine the Speaker's control via recognition, and (2) Crisp, who overruled Reed, was Reed's principal opponent in the quorum-counting battles of the previous Congress.

The precedents were not perfunctorily pro-committee, however. In 1892 the speaker pro tempore ruled that rights to recognition shall alternate between proponents and opponents of a bill, even if it is necessary to go outside the committee to find opponents (Hinds: 72).

4. Representative McMillin was recognized for a parliamentary inquiry, was informed that a motion to suspend the rules was in order, and "announced his desire to suspend the rules," whereupon Representative Dingley sought recognition, attained it, and moved that the House adjourn. The House adjourned.

1900, for example, Representative Sulzer claimed recognition and Speaker Henderson ruled that "the gentleman was not recognized, and the Chair may as well state that the Chair will recognize no gentleman unless he has some knowledge of what is going to be called up" (Chiu: 169). Similarly, in 1904 Speaker Cannon replied as follows to a member who was deprived of recognition:

The present occupant of the Chair, the Speaker of the House, follows the usual rule that has been obtained ever since he has been a member of the House, that the Chair chooses whom he will recognize. . . . Other things being even or anything near even, if there be a question, under present conditions, in the closing hours, the Chair has a perfect right . . . to prefer some one with whom, perchance, the Chair is in sympathy, or upon the Chair's side of the House (quoted in Chiu: 172).

2.2. SUSPENSION OF THE RULES

Orderly conduct of business can be facilitated by recognition procedures. But collective decision making bodies typically also have standing rules that determine a "regular order of business." Moreover, in spite of the control that may be afforded by recognition procedures, members often find it convenient to deviate from the regular order. Under the standing rules of the House, for example, bills are considered in the order in which they are reported from committees. This simple procedure precludes giving high priority to important bills if, for example, they happen to have been reported relatively late due to the extraordinary work required to draft complex legislation in committee.

From the early Congresses, the House addressed the problem of rigidity in its standing rules under the auspices of its Constitutional authority to determine the rules of its proceedings. The procedure it used was suspension of the rules. The suspension procedure has a history of diverse applications, with the nature and extent of its use determined largely by other procedures at the disposal of the parent chamber at a given time.⁵ For the present discussion, generalizations about the use of the procedure in two periods are useful: before and after the 1870s.

Prior to the 1870s the typical uses of the suspension procedure were to change standing rules or to deviate from the regular order of business via two-thirds vote. Early constraints on the use of the suspension procedure were minimal, requiring only that the House receive one day's notice prior to offering a motion to change or rescind a standing rule or order of the House. Precedents in the 1820s established what had by then become common practice. In 1822 the standing rule providing for suspension of the rules was changed to require a two-thirds vote of members present.⁶ In 1828 the

5. For more thorough historical accounts, see Hinds (5, ch. 142) and Bach (1986).

6. Except for unusual circumstances in the 51st Congress, suspension of the rules has always required a two-thirds vote (Hinds: 5, 6970, p. 903).

procedure was explicitly linked to the order of business (Hinds: 5, 6790). For several decades, suspension served as a convenient instrument for deviating from the regular order by providing for special consideration of bills. Although suspension sometimes also specified conditions for debate, bills that were brought to the floor via suspension were normally debated freely and were open to amendment as specified by the standing rules (Hinds: V, 5856).

Beginning in the late 1860s, suspension became more restrictive in terms of permissible amendments to legislation. In 1868, for example, it became "possible by one motion both to bring a matter before the House and pass it under suspension of the rules" (Hinds: 5, 6846).⁷ In 1876 a precedent established that "the rules may be suspended by a single motion and vote, so as to permit the House to vote first on a specified amendment to a bill and then on the bill itself" (Hinds: 5, 6851). And in each of the following three years, major bills were passed under suspension motions that not only restricted amendments but also permitted no debate. A leading authority on congressional procedure speculates that "it certainly seems likely that bills of such importance were passed under suspension of the rules in order to preclude debate and amendment, not simply in order to expedite business" (Bach, 1986: 56).

Use of suspension for restrictive purposes continued after changes in the standing rules in 1880 which, among other things, set aside two Mondays per month for suspension motions. The revised procedures favored committees by designating one day as committee suspension day.⁸ A decade later two rulings by Speaker Reed strengthened committees' use of suspension. The first protected committees from jurisdictional infringement by requiring that when a committee offers a motion to suspend the rules to consider a bill, the bill must have been referred to that committee. The second stipulated that a member offering a suspension motion on behalf of a committee must have received formal authorization from the committee (Bach, 1986: 24).

Application of the suspension procedure to restrict debate and amendments was also augmented by the Speaker's recognition powers. Hinds explains that during early Congresses, when "the Speaker was compelled to recognize any Member who first got his attention on the motion to suspend the rules" the suspension procedure was "greatly abused." Individuals would propose to bring up special interest bills about which other members were often ignorant. "To prevent this snare" the House frequently adjourned

7. The case was "a resolution providing a special order for considering the impeachment of Andrew Johnson" (*ibid.*).

8. "Although the distinction remained until 1973, it came to have little significance, as the expectation became firmly established that most measures considered under suspension would first have been reported from committee" (Bach, 1986: 24-25). Also, the suspension procedure in practice sometimes conferred disproportionate procedural benefits to standing committees even before 1880. In 1856 and 1857, for example, precedents were established "to suspend the rules to enable one or several bills to be reported from committees and at the same time to be considered in the House" (Hinds: 1592).

when suspension motions were offered (Hinds, quoted in Chiu: 199). Later in the century when stronger recognition powers had been established, however, the suspension procedure could be applied selectively⁹ and with increasing restrictiveness. After 1880, into the twentieth century, and at present, the procedure can effectively preclude *all* amendments to a measure. On a typical motion to suspend the rules, a single two-thirds vote has the effect both of suspending the rules and of passing the motion unamended.¹⁰

2.3. SPECIAL ORDERS AND THE COMMITTEE ON RULES

All collective decisionmaking bodies have recognition procedures; most have procedures establishing a regular order of business; and some have procedures for deviating from the regular order. The House of Representatives has used all of these procedures with varying degrees of restrictiveness. Since the creation of the Rules Committee as a permanent standing committee in 1880, it also has employed a mechanism for proposing *special procedures for specific bills*. The mechanism is the "special order," and its history is consistent with the thesis of this section. Congressional rules exhibited a capacity for assigning increasingly restrictive special orders beginning in the 1870s.

From the first day of the first Congress, the Rules Committee has been the initiator in changes to the House's *standing* rules. Prior to the 1870s, however, its role in day-to-day proceedings was usually minor. In all but two Congresses between 1789 and 1880 the Committee on Rules was merely a select committee authorized at the beginning of each Congress to report a system of standing rules (Hinds: 4, 4321). Nevertheless, harbingers of a Rules Committee with a capacity for proposing restrictive consideration of legislation can be found prior to 1880. In 1841 a precedent was established that became the basis for the Rules Committee issuing bill-specific resolutions at any time (Hinds: 1538). In 1850 the Committee was given exclusive jurisdiction over reports to change the rules (Hinds: 1540).¹¹

9. For example, Speaker Crisp ruled in 1893: "The Chair fully appreciates the fact that according to the practice which has always prevailed the motion to suspend the rules has been one depending on recognition; that is, it can not be made unless the Member is recognized to make it. The Chair, in speaking of this motion as one of the highest privilege, did not mean to convey the idea that necessarily when the day comes for motions to suspend the rules the chair must recognize a gentleman to make such a motion" (Chiu: 200).

10. The motion may include amendments, but this is only superficially nonrestrictive. For example, a member may move to suspend the rules and pass H.R. 999 with amendments as reported by the Committee on Ways and Means. But because the amendments referred to in the motion are not subject to further amendment, the vote on the motion is tantamount to a two-thirds majority, take-it-or-leave-it vote on the bill with the committee amendments. (Such amendments typically originate from the committee with jurisdiction over the bill (Oleszek: 101).)

11. The significance of this precedent requires several qualifications. The Committee did not yet have standing status, reports to change rules still required a two-thirds vote, and the suspension procedure was still often available to members without prior reference to the Rules Committee.

In 1853 the Speaker ruled that a report from the Rules Committee must be acted on until disposed of, thus giving such reports precedence over the regular order (Chiu: 118). In 1859 the Speaker was made *ex officio* Chairman of the Committee (Alexander: 193). And by the 1870s, House members had adopted the practice of referring resolutions to change the rules to the Rules Committee (Hinds:4, 6790).¹² Although of questionable individual significance, these precedents collectively became the basis for the ensuing "era of the special order" (Atkinson: ch.5).

The distinct catalyst was the rules changes of 1880 which, not coincidentally, were drafted and proposed by the Rules Committee. The result was increasing use of *bill-specific* special orders.¹³ Like previous applications of suspension of the rules, special orders enabled deviation from the regular order of business to consider specified bills. But special orders differed from suspension of the rules in two important respects. First, after 1883 a simple majority rather than two-thirds majority could adopt a special order (Hinds 4, 3152).¹⁴ Second, because the permanent standing Rules Committee assumed the role of screening bills for legislative consideration, special orders became more flexibly applied than suspension of the rules in their imposition of restrictions on amendments to bills. Thus, after 1880 "the use of the motion to suspend the rules has gradually been restricted, while the functions of the Committee on Rules have been enlarged" (Hinds: 4, 6790).

Hinds' Precedents contains several pages of examples of special orders that provided for consideration of bills with varying degrees of restrictiveness. Restrictions come in two forms: time allotted for consideration of bills and amendments permitted on such bills. Special orders on the open end of the continuum include resolutions providing for consideration of bills amended by a substitute from the reporting committee but where the committee substitute is open to amendment (Hinds: 4, 3238, 3239, 3241). Slightly more restrictive procedures were provided for in a special order that permitted

12. Hinds writes that this practice had already begun as early as 1842 and concludes: "Gradually the Committee on Rules was intrusted with all amendments [to the rules], the end of the old system coming formally with a ruling made in 1887" (4, 6790).

13. Special orders are now often referred to as special rules (Bach, 1981).

14. The literature is not entirely consistent on the question of when majority-approved special orders began to be used regularly. Hinds (5, 6775) states that "in 1875 the function of the Committee on Rules in reporting rules for special purposes was so little used that there was doubt as to its validity without a two-thirds vote." And in his introductory remarks to the chapter on special orders he writes that after the method of adopting a special order by majority vote was used in 1883, "this method was not in great favor in the next three Congresses." Alexander, however, reports that "[after] the Rules Committee reported during the Forty-eighth Congress [1883-85] three special orders which a majority adopted, the procedure grew slowly in favor. In the Forty-ninth Congress, . . . Carlisle not only used it more freely, but added greatly to the Rules Committee's prestige by extending its jurisdiction to the order of business. After the gift of this high privilege, the House, accustomed to parliamentary surprises, stood aghast when the Committee, in a single special order, adopted by a majority, fixed the order of business for sixteen legislative days" (205).

offering of two substitutes but limited the time for amendments and limited the total time for consideration of the bill (Hinds: 4, 3229). A still more restrictive procedure was provided for in a special order that permitted only amendments that were listed in the special order (Hinds: 4, 3235).¹⁵ In a similar special order, the permissible amendments were those recommended by the Committee on Interstate and Foreign Commerce, which had jurisdiction over the bill in question (Hinds: 4, 3233). Finally, several special orders not only restricted time for consideration of legislation but also prohibited amendments entirely (Hinds: 4, 3231, 3234, 3236).¹⁶

Beginning in the 1880s special orders were also used often for considering bundles of bills and for resolving bicameral differences. But the key feature of special orders in the context of the present discussion is their capacity for restricting opportunities of the parent chamber to amend legislation reported by its standing committees. Consistent with the historical trends in recognition powers and suspension of the rules, procedural restrictiveness had become not only possible but also common by the last three decades of the nineteenth century. Furthermore, the institutional mechanisms whereby the parent chamber constrains its behavior have persisted and are central to the proceedings of the contemporary Congress as well.

2.4. THE PUZZLE OF RESTRICTIVE PROCEDURES

The historical discussion illustrates several procedural mechanisms that can protect committee proposals from amendments on the floor of the U.S. House of Representatives. A key characteristic of these mechanisms is that they constitute selective commitments by the parent chamber to limit its ability to amend committee proposals. The credibility of these commitments is enhanced through delegation of procedural powers to a third party. In the House, for example, recipients of such powers include the Speaker, the Rules Committee, and party leaders, all of whom can greatly facilitate the application of restrictive procedures.

The historical discussion also raises two important questions. The first question is specific. Why did restrictive procedures emerge in the nineteenth-century House? The second question is generic to collective decisionmaking characterized by majority rule, division of labor, specialization, and procedural complexity. Why and when would a parent chamber commit to the use of procedures that appear to limit its influence on the selection of policies? This question is particularly perplexing when it is recognized that the mechanisms for applying restrictive procedures are subject to the periodic approval of the parent body. We return to the specific question in section 7 after presenting a model that uncovers the more general rationale

15. Today this would be called a modified closed rule.

16. Today these would be called gag rules or closed rules.

for restrictive procedures in collective decisionmaking bodies with standing committees.

3. COLLECTIVE DECISIONMAKING WITH STANDING COMMITTEES

This section introduces a game-theoretic model for examining the motivations for and effects of unrestrictive and restrictive amendment procedures. The model has three unique and key assumptions: (1) the parent body determines whether an unrestrictive or restrictive procedure governs consideration of a committee's proposal; (2) actors are uncertain about the consequences of various policies; and (3) a standing committee can acquire private information or "expertise" about the consequences of policies by incurring a cost. The analysis takes as given the centrality of committees in collective decisionmaking and illustrates formally the informational role of committees in a multi-stage choice process.

3.1. POLICIES AND CONSEQUENCES

Unlike all extant models of committee-parent body decisionmaking, this model views policies (or laws) and consequences (or outcomes) as fundamentally distinct and assumes that the consequences of policy are not known with certainty.¹⁷ Of course, not all collective choice is characterized by uncertainty. But policies are often new, untried, and subject to the vicissitudes of implementation. For example, legislation is always subject to judicial interpretation which may be at variance with legislative intent, or administrators may execute laws inconsistent with legislative preferences when preferences are heterogeneous or when legislative oversight is imperfect. Similarly, the political or economic environment in which policy consequences are realized may be subject to random variation beyond the immediate control of political decisionmakers. For example, macroeconomic conditions affect federal revenues for any given tax policy, international events affect national security for a given level of defense spending, and weather affects the crop yields and hence the costs and benefits of agriculture policy.

The formal assumption that incorporates uncertainty is that there is a stochastic and linear relationship between a policy and its consequences. This relationship is given by $x = p + \omega$, where x is the consequence or outcome of the policy, p is a policy in a unidimensional space $P \subset R^1$, and ω is a random

17. See, however, Austen-Smith and Riker for a model that makes a similar distinction between policies and consequences but focuses on costless private information within a single committee rather than costly information for a committee acting within a larger, multistage institution.

variable uniformly distributed in $[0, 1]$ with mean $\bar{\omega}$ and variance σ_{ω}^2 .¹⁸ Thus, when the game begins, decisionmakers do not know the exact consequences of various policies. Nor do they know this during the game unless they know or can make inferences about the value of the random variable.

3.2. PLAYERS AND PREFERENCES

The legislative policy results from a sequence of decisions by two actors, a committee and a parent chamber majority.¹⁹ For brevity, the parent chamber is referred to as the "floor." Each actor's utility is expressed, in part, as the negative of the squared deviation of the policy consequence, x , from the actor's most preferred policy consequence or "ideal point." For simplicity and without loss of generality, the ideal points of the floor and committee are given by $x_f = 0$ and $x_c > 0$, respectively. With this assumption, x_c represents the absolute difference between floor and committee ideal points.

The possibility of specialization in an uncertain policy environment is represented by the ability of the committee to determine the exact relationship between policies and consequences. Specifically, by incurring a cost, k , the committee can observe the exact value of the random variable, ω . If acquired, this value is private information known only to the committee. If the committee chooses not to incur the cost to observe ω , however, the committee does not possess an informational advantage on the floor. The committee's decision to observe ω is represented by the variable s (for "specialization") which takes a value of 0 or 1 when the committee does not or does know ω , respectively. Although the value of ω is not public knowledge, the value of s is public knowledge. That is, the floor knows whether or not the committee has specialized.

The floor and committee actors seek to maximize expected utility. Utilities are given by u_f and u_c , respectively, where $u_f = -(x - x_f)^2 = -x^2$ and $u_c = -(x - x_c)^2 - sk$.

3.3. STRUCTURE OF THE GAME

The interaction between the floor and the committee is represented as a noncooperative game under incomplete information. When the game begins, neither the committee nor the floor knows ω . However, both players know the prior probability density of ω , the other parameters of the model (x_c , x_f ,

18. Given the assumption that ω is uniformly distributed on the unit interval, $\bar{\omega} = \frac{1}{2}$ and $\sigma_{\omega}^2 = \frac{1}{12}$.

19. The assumption of a unitary floor actor in this unidimensional setting is justified by Black's median voter theorem. The assumption of a unitary committee actor is relaxed in Gilligan and Krehbiel (1987).

and k), the functional form of the relationship between policies and outcomes, and the utility functions. Actors take the actions in the order shown in figure 1.

First, the parent chamber (floor) selects and commits to the use of a procedure. Two pure types of amendment procedures are considered. The *unrestrictive amendment procedure*, P^u , does not limit the floor's ability to

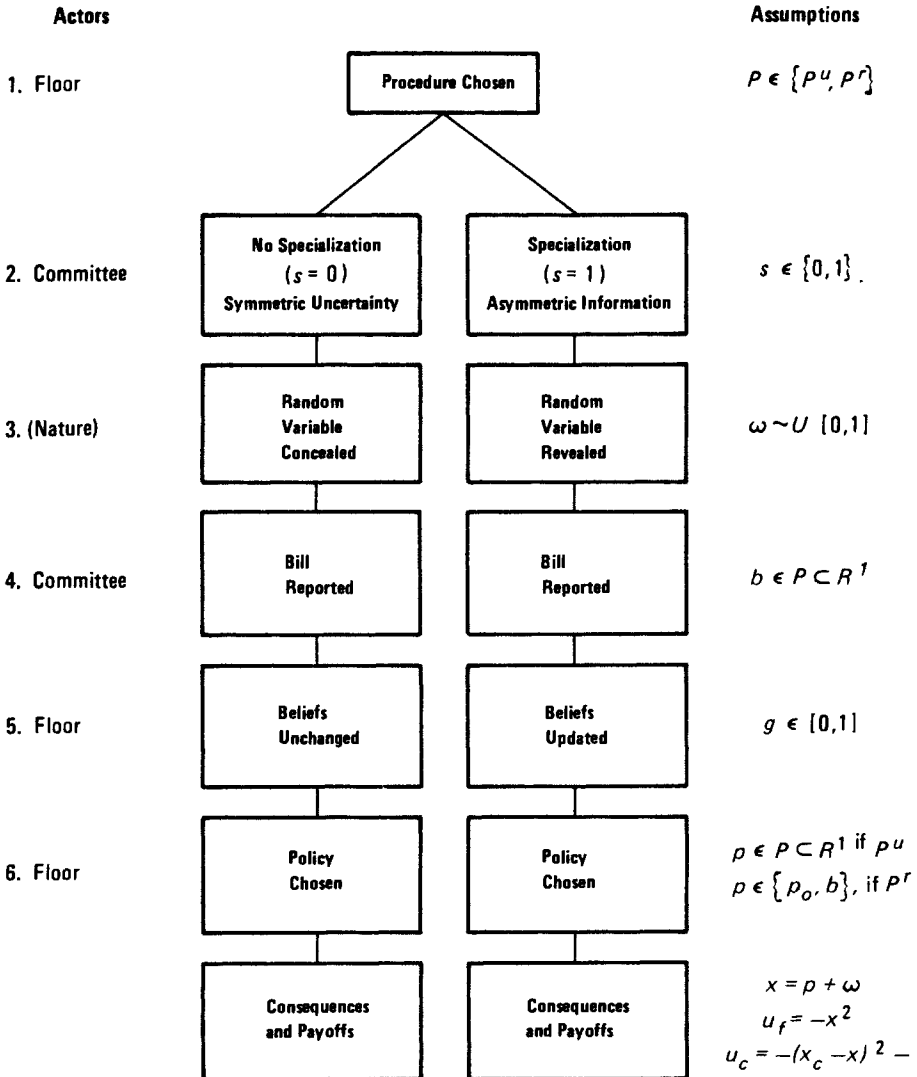


Figure 1. Stages of the Game under Alternative Information Structures

alter the bill proposed by the committee. The floor may choose any policy contained in the set of feasible policies. In a congressional setting, this procedure is often referred to as an open rule. The *restrictive amendment procedure*, P^r , limits the floor's ability to amend the committee's bill to a choice between the status quo policy and the bill proposed by the committee. This "take-it-or-leave-it" procedure is sometimes referred to as a closed rule. Obviously, these two amendment procedures do not exhaust the set of procedures discussed in section 2. However, alternative procedures may be regarded as combinations of the P^u and P^r processes, and insights into more complicated and realistic amendment procedures can be gained by examining the characteristics of the pure procedures.

Second, the committee decides whether to specialize by acquiring information about the consequences of policy. If the committee chooses to incur a cost (k) to obtain private information about the random variable (ω), then $s = 1$ and the game continues under asymmetric information. This choice of $s = 1$ is alternatively referred to as "specialization" or "acquiring expertise."²⁰ If the committee does not specialize, however, then $s = 0$ and actors subsequently choose a policy under symmetric uncertainty. These two informational situations are represented by the left and right columns in figure 1.

Third, an exogenous and nonstrategic player, "nature," determines the exact value of the random variable (ω). If the committee did not specialize, the value is concealed. If the committee did specialize, the value is revealed only to the committee. Fourth, the committee chooses a bill (b) from the set of feasible policies (P) to report to the floor for final consideration. Fifth, the floor actor updates his beliefs about the consequences of various policies. In particular, he knows whether or not the committee specialized (s) but not what information the committee acquired (ω) if it specialized. He therefore makes inferences about the random variable based upon his knowledge of the committee's preferences, his observation of the committee's bill, his knowledge of whether the committee has private information, and his assumption that the committee behaves rationally. Notice, however, that the floor's beliefs change at this stage only if the committee specialized in the previous stage, because otherwise no new information is available. Sixth, the floor actor chooses a policy (p) that is permitted by the amendment procedure. Under the unrestrictive procedure (P^u), any policy ($p \in P$) can be chosen. Under the restrictive procedure (P^r), the floor must accept either the bill (b) as reported by the committee or an exogenously given status quo policy (p_o). Finally, the outcome (x) is realized and payoffs are assigned in accordance with the utility functions.

20. Concrete manifestations of this form of specialization include congressional activities such as scheduling witnesses, issuing subpoenas to the executive branch for information, holding hearings, or allocating staff to study a problem or to draft legislation.

3.4. EQUILIBRIA AND EFFICIENCY CRITERIA

The major objective of the analysis is to determine the floor's choice of an amendment procedure. The three levels of analysis required are sketched in figure 2. First, equilibria are identified for four games in which the procedural decision of the floor and the specialization decision of the committee are given. These games are referred to as *legislative games* and are denoted $\langle P^u | s = 0 \rangle$, $\langle P^u | s = 1 \rangle$, $\langle P^r | s = 0 \rangle$, and $\langle P^r | s = 1 \rangle$. As suggested by the notation, legislative games take both the procedural and the specialization decisions as given. Second, characterizations of the legislative games are used to identify the committee's specialization decision. Thus, two *expertise games* are analyzed, one for each type of procedure, P^u and P^r . In an expertise game, the committee unilaterally chooses which of the two possible legislative games to play under a given procedure. Third and finally, the characteristics of the legislative and expertise equilibria are used to determine the solution to the *procedural game* in which the floor chooses from $\{P^u, P^r\}$ to maximize its expected utility given optimal behavior in the subsequent expertise and legislative games.

The sketch of the analysis accentuates the need for defining and explaining

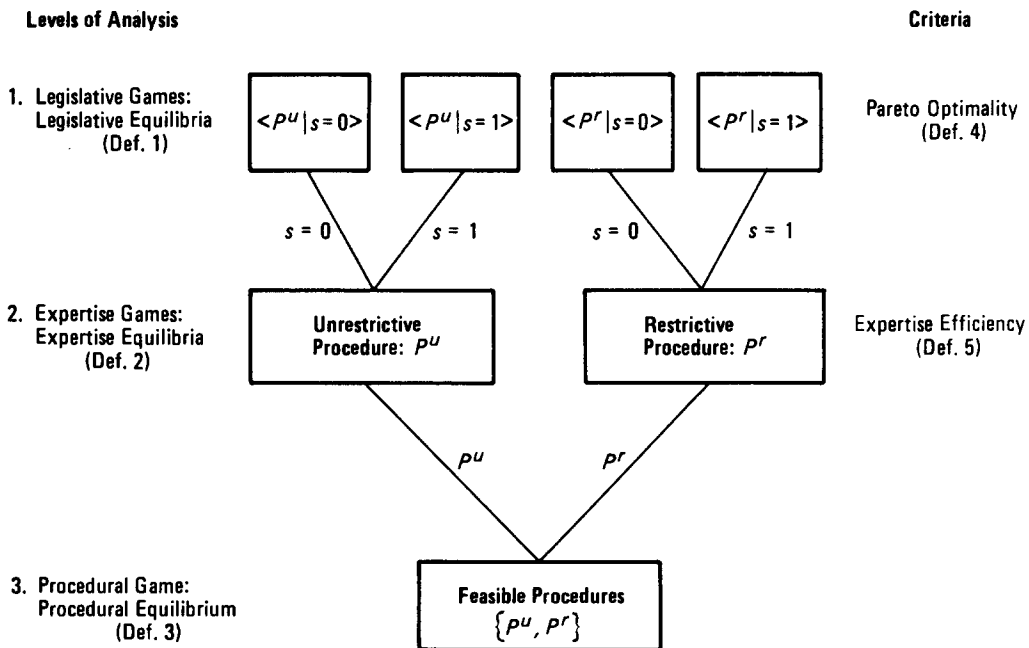


Figure 2. Sketch of the Analysis

the equilibrium and efficiency concepts to be employed. Analysis of the four legislative games employs a type of sequential or perfect Bayes equilibrium. This equilibrium satisfies the best response property commonly found in games of complete information. In addition, each player, according to Bayes's Rule, incorporates information and beliefs about the game into his optimal strategy. Each player responds optimally to the strategy choice of the other player given his information and updated beliefs. In the current model, the concept of sequential or perfect Bayes equilibrium extends the normal application of Nash equilibrium to games with incomplete information.²¹

In the four legislative games with the procedure and specialization decision given, an equilibrium must satisfy three conditions. First, given its beliefs about the value of the random variable (ω), the floor's strategy must be a best response. Based upon the committee's bill (b) the floor forms beliefs about the random variable. The strategy it plays must maximize its expected utility given these beliefs. Second, given the floor's optimal response, the committee's strategy must be optimal. The floor's optimal strategy is a function of the committee's bill. The committee's selection of a bill must maximize its expected utility given optimal floor behavior. Third, the floor's beliefs must be realized in equilibrium. The rationale for this third condition is simply that, in equilibrium, one would not expect the floor to incur losses associated with systematic misperceptions. Thus, the floor's beliefs about the random variable based on the committee's bill must be self-confirming. Formally,

Definition 1. A legislative equilibrium is a set of strategies, $p^*(\cdot)$ and $b^*(\cdot)$, and beliefs, $g^*(\cdot)$, such that

- a. $b^*(\omega)$ maximizes Eu_c , given $p^*(b)$,
- b. $p^*(b)$ maximizes Eu_f , given $g^*(b)$, and
- c. $g^*(b) \subseteq [0, 1]$ for all b and $g^*(b) = \{\omega | b = b^*(\omega)\}$ whenever $g^*(b)$ is non-empty.

That is, (a) the committee's strategy maximizes its expected utility given optimal behavior of the floor; (b) the floor's strategy maximizes its expected utility given its beliefs about ω ; and (c) the floor's beliefs are consistent with optimal committee behavior and are realized in equilibrium.

After analysis of the legislative equilibria for the legislative games, the focus is on the expertise games, which are distinguished from legislative games by the addition of the committee's specialization decision. Given the committee's expectation that actors are expected utility maximizers, what is equilibrium behavior with respect to its decision of whether to seek policy

21. The equilibrium concept used here is identical to those used implicitly by Akerlof and by Spence and explicitly by Milgrom and Roberts (1982a,b) and Kreps and Wilson (1982a). For a complete survey of this literature, see Fudenberg and Tirole. For a general definition of sequential equilibrium, see Kreps and Wilson (1982b).

expertise (that is, whether to incur k to observe ω)? The answer is a simple extension of the legislative equilibrium.

Definition 2. An *expertise equilibrium* is an expertise decision s^* such that

$$Eu_c(s^*|b^*(\omega), p^*(b), g^*(b)) \geq Eu_c(s'|b^*(\omega), p^*(b), g^*(b)), s^* \neq s'.$$

This equilibrium identifies the committee's decision regarding specialization conditional on its expectations about subsequent committee *and floor* behavior under a given procedure.

A final equilibrium is identified by focusing on the parent chamber's choice of procedures, based on Eu_f under P'' or P' .

Definition 3. A *procedural equilibrium* is a procedure P^* such that

$$Eu_f(P^*|s^*, b^*(\omega), p^*(b), g^*(b)) \geq Eu_f(P'|s^*, b^*(\omega), p^*(b), g^*(b)), P^* \neq P'.$$

Thus, based on rational expectations regarding the subsequent expertise and legislative games, the floor actor selects the procedure from the set $\{P'', P'\}$ that maximizes its expected utility.

The critical dependence of legislative and expertise equilibria on procedure is demonstrated and explained below. Two normative criteria are employed to compare the equilibria in the legislative and expertise games in the first two levels of analysis. The first facilitates ex post comparisons of equilibria in the four legislative games and focuses simply on whether the realized outcome lies on the contract curve between x_f and x_c . This is the conventional Pareto criterion.

Definition 4. A realized outcome, $x = p^* + \omega$, is Pareto optimal if and only if it lies in the interval $[0, x_c]$.

The second criterion is used to compare the two expertise games and focuses on whether the committee's specialization decision maximizes the sum of expected utilities of the two actors. In contrast to Pareto optimality, the expertise efficiency criterion is based on expectations about subsequent behavior of the game rather than on realized outcomes.

Definition 5. An expertise game is *expertise efficient* if and only if, in the expertise equilibrium, $Eu_L(P|s^*) \geq Eu_L(P|s')$, where $Eu_L = Eu_f + Eu_c$ and $s^* \neq s'$.

The analysis of the paper is part normative and part positive. The positive concerns, represented by definitions 1–3, pertain to the actions that rational actors take in the sequential decisionmaking setting. The normative concerns, represented by definitions 4 and 5, pertain to whether these actions, ex post or ex ante, yield desirable behavior and outcomes. Although the normative criteria are useful in highlighting some properties of alternative procedures,

the rationale for restrictive procedures (summarized in proposition 7 below) is a positive, *individually* rational, phenomenon. That is, under the conditions specified, a restrictive procedure is the equilibrium in the procedural game. It does not result simply because of its normative properties.

4. UNRESTRICTIVE AMENDMENT PROCEDURES

This section identifies legislative equilibria for the two legislative games ($\langle P^u | s = 0 \rangle$ and $\langle P^u | s = 1 \rangle$) and the expertise equilibrium for the unrestrictive amendment procedure (P^u). This procedure allows the floor to choose any policy ($p \in P$) in response to the committee's bill (b).²² The section also presents the expected utilities in the P^u games and assesses Pareto optimality and expertise efficiency.

4.1. UNRESTRICTIVE PROCEDURES WITHOUT COMMITTEE EXPERTISE

The legislative equilibrium, expected utilities, and optimality properties for $\langle P^u | s = 0 \rangle$ are easy to calculate. Since the committee does not specialize ($s = 0$), it does not possess private information regarding the consequences of policy. This is common knowledge. Consequently, the floor disregards the committee's proposal and selects a policy that maximizes its expected utility given its prior belief about ω . Proposition 1 identifies the legislative equilibrium, the Pareto optimality of its realized outcomes, and the floor and committee expected utilities for $\langle P^u | s = 0 \rangle$.²³

Proposition 1. For the legislative game $\langle P^u | s = 0 \rangle$,

- a. the legislative equilibrium is

$$\begin{aligned}
 b^* &\in P, \\
 p^*(b) &= -\bar{\omega}, \\
 g^*(b) &= \{\omega | \omega \in [0, 1]\};
 \end{aligned}$$

- b. the expected utilities are

$$\begin{aligned}
 Eu_f \langle P^u | s = 0 \rangle &= -\sigma_\omega^2, \\
 Eu_c \langle P^u | s = 0 \rangle &= -\sigma_\omega^2 - x_c^2;
 \end{aligned}$$

22. The committee is not permitted to obstruct legislation by refusing to report a bill. Thus, an assumption regarding a status quo or reversion point is not required for the analysis of P^u .

23. Proofs of propositions are contained in the appendix.

c. outcomes are Pareto optimal if and only if

$$\omega \in [\bar{\omega}, x_c + \bar{\omega}],$$

Figure 3 depicts the legislative equilibrium and policy consequence for $\langle P^u | s = 0 \rangle$. The horizontal axis represents the value of the random variable (ω) and the floor's beliefs (g^*). The vertical axis represents the committee's proposed bill (b^*), the floor's policy choice (p^*), and the realized outcome (x). The shaded region reflects the values of proposed bills consistent with the legislative equilibrium. In the legislative game $\langle P^u | s = 0 \rangle$, the floor's beliefs do not depend on the committee's bill because the floor knows that the committee possesses no private information. The floor's best response is to maximize its expected utility given its prior knowledge about the distribution of the random variable. This policy is $p^* = x_f - \bar{\omega} = -\bar{\omega}$ and is shown as the horizontal line at $-\bar{\omega}$. Expectationally, it yields an outcome at the floor's ideal point, since $x = p^* + \bar{\omega} = 0 = x_f$. Given the floor's strategy, the committee's strategy is inconsequential. Realizing that it cannot affect the floor's policy choice, the committee proposes any bill, $b \in P$, hence the large shaded region in figure 3.

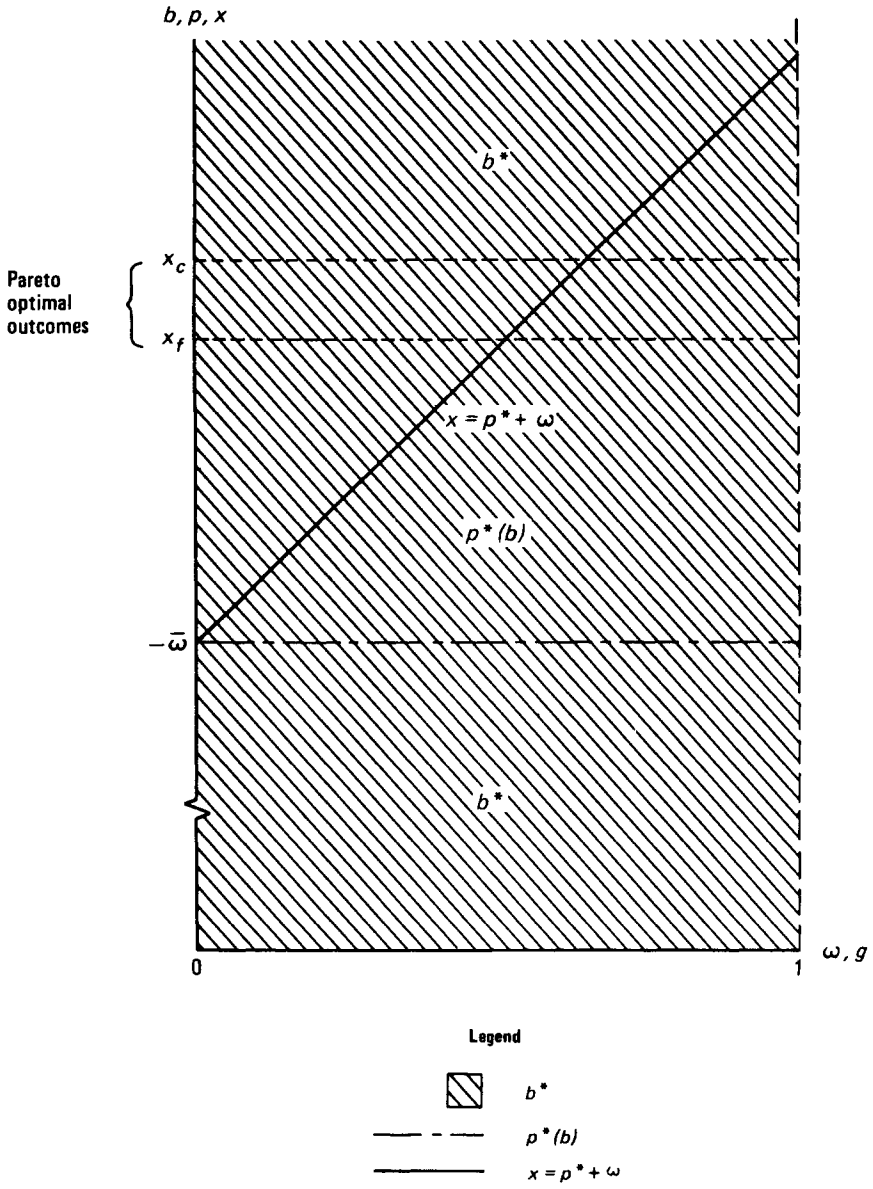
Uncertainty about the consequences of policies requires players to incur losses in utility as a consequence of the uncertainty about the effects of policies on outcomes. With quadratic utility functions, these losses equal negative the variance in the random variable ($-\sigma_\omega^2$). Because the expected outcome of the game is $x_f = 0$, the committee's expected utility contains another loss term equal to $-x_c^2$.

The solid diagonal line in figure 3 represents the realized outcome, which is *not* Pareto optimal for at least half the values of the random variable. Furthermore, the smaller is x_c , the larger is the range of ω for which outcomes are not Pareto optimal.

The simplicity of $\langle P^u | s = 0 \rangle$ illustrates the potential importance of information under unrestrictive procedures. The committee's proposal is irrelevant to the collective choice process whenever the committee does not specialize. Because the floor knows that the committee does not possess policy expertise, it ignores the committee's bill. The committee therefore plays no informational role in this legislative game. Consequently, both actors suffer an informational loss of $-\sigma_\omega^2$. Additionally, the committee suffers a distributional loss of $-x_c^2$.

4.2. UNRESTRICTIVE PROCEDURES WITH COMMITTEE EXPERTISE

The legislative equilibrium for $\langle P^u | s = 1 \rangle$ is more complicated and accentuates the subtle but fundamental role information plays in multistage collective decisionmaking under uncertainty. By definition, when $s = 1$ the committee knows the value ω . Both the floor and the committee *may* benefit by incorpo-



(See Proposition 1)

Figure 3. Legislative Equilibrium: Unrestrictive Procedure without Committee Expertise

rating this information into the legislative choice. For example, suppose the committee reports a bill from which the floor can infer the exact value of ω . Then the floor would use this information to select a policy that maximizes its expected utility. This policy is simply $p = x_f - \omega$, which would yield the floor's ideal point with certainty. In this case $Eu_f = 0$ and $Eu_c = -x_c^2$. Due to the elimination of uncertainty, these expected payoffs are greater than those under $\langle P^u | s = 0 \rangle$ (see proposition 1b).²⁴ Thus, committee specialization *appears* to benefit both actors.

However, in this legislative game the floor can never, in equilibrium, infer the exact value of the random variable from the committee's bill.²⁵ Recall from definition 1 that a legislative equilibrium requires that the strategy of the committee be optimal given the floor's strategy, and that the floor's beliefs be realized in equilibrium. For any floor strategy that presumes a one-to-one relationship between the committee's bill and ω , the committee has an incentive to report a bill that causes the floor to make an erroneous inference about ω that would lead to an outcome closer to or equal to the committee's ideal point. Because of this incentive, the floor's beliefs cannot be realized in equilibrium, and there exists no equilibrium in which exact inference is possible.²⁶

At best, a legislative equilibrium for the game must involve *noisy signaling*.²⁷ A noisy signaling equilibrium permits the floor to make limited inferences about ω from the committee's bill. That is, the floor can infer only that ω lies in a particular range, or partition, of the $[0, 1]$ interval.

To identify this equilibrium, let N be the number of partitions of the unit interval (the support of ω) and let a_i be the boundaries of the partitions (where $a_i < a_{i+1}$ for $i = 0, \dots, N-1$). Then set a_0 equal to zero (the lowest value of ω) and a_N equal to one (the highest value of ω). Proposition 2 identifies the legislative equilibrium, the expected utilities, and the Pareto optimality of the realized outcomes for $\langle P^u | s = 1 \rangle$.²⁸

24. The cost term is omitted from the committee's expected utility only because specialization is assumed to occur for analysis of the legislative game. Were the term to be included, the statement would hold whenever $k < \sigma_\omega^2$. Further discussion of the cost term is deferred until analysis of the expertise games.

25. Were such exact inference possible, the equilibrium would be called "fully revealing" or "separating" because it "fully reveals" the previously private information or perfectly "separates" the message (bill) into types (values of ω).

26. Formally, suppose the floor believes it can infer ω from the committee's bill. Then the floor adopts the policy $p = -\hat{\omega}$, where $\hat{\omega}$ is the floor's inference about ω given b , i.e., $b^{-1}(\omega)$. But given this floor strategy, the committee wants the floor to believe that $\hat{\omega} = \omega - x_c$, since $x = p + \omega = -\hat{\omega} + \omega = x_c$, the committee's ideal point.

27. Such equilibria are sometimes called "pooling" because they "pool" the private information thus not allowing a unique type (value of ω) to be inferred from a given message (bill).

28. The $\langle P^u | s = 1 \rangle$ game is based on Crawford and Sobel. Two sources of nonuniqueness of legislative equilibria arise in the model. First, for any equilibrium involving $N > 1$, there always exist alternative equilibria with fewer partitions. That is, "coarser" equilibria also exist. A strong case can be made for considering only the equilibrium with the "finest" partition, however. Ex ante utility of both the floor and the committee are maximized under the finest

Proposition 2. For the legislative game $\langle P^u | s = 1 \rangle$,

a. a legislative equilibrium is

$$\begin{aligned}
 b^*(\omega) &\in [x_c - a_{i+1}, x_c - a_i), & \text{if } \omega \in [a_i, a_{i+1}], \\
 p^*(b) &= \begin{cases} -(a_{N-1} + a_N) / 2 & \text{if } b < x_c - 1, \\ -(a_i + a_{i+1}) / 2 & \text{if } b \in [x_c - a_{i+1}, x_c - a_i], \\ -(a_o + a_1) / 2 & \text{if } b > x_c, \end{cases} \\
 g^*(b) &= \begin{cases} \{\omega | \omega \in [a_{N-1}, a_N]\} & \text{if } b < x_c - 1, \\ \{\omega | \omega \in [a_i, a_{i+1}]\} & \text{if } b \in [x_c - a_{i+1}, x_c - a_i] \\ \{\omega | \omega \in [a_o, a_1]\} & \text{if } b > x_c, \end{cases}
 \end{aligned}$$

where $a_o = 0$, $a_i = a_j i + 2i(1 - i)x_c$, $a_N = 1$, and N is the largest integer such that $|2N(1 - N)x_c| < 1$;

b. the expected utilities are

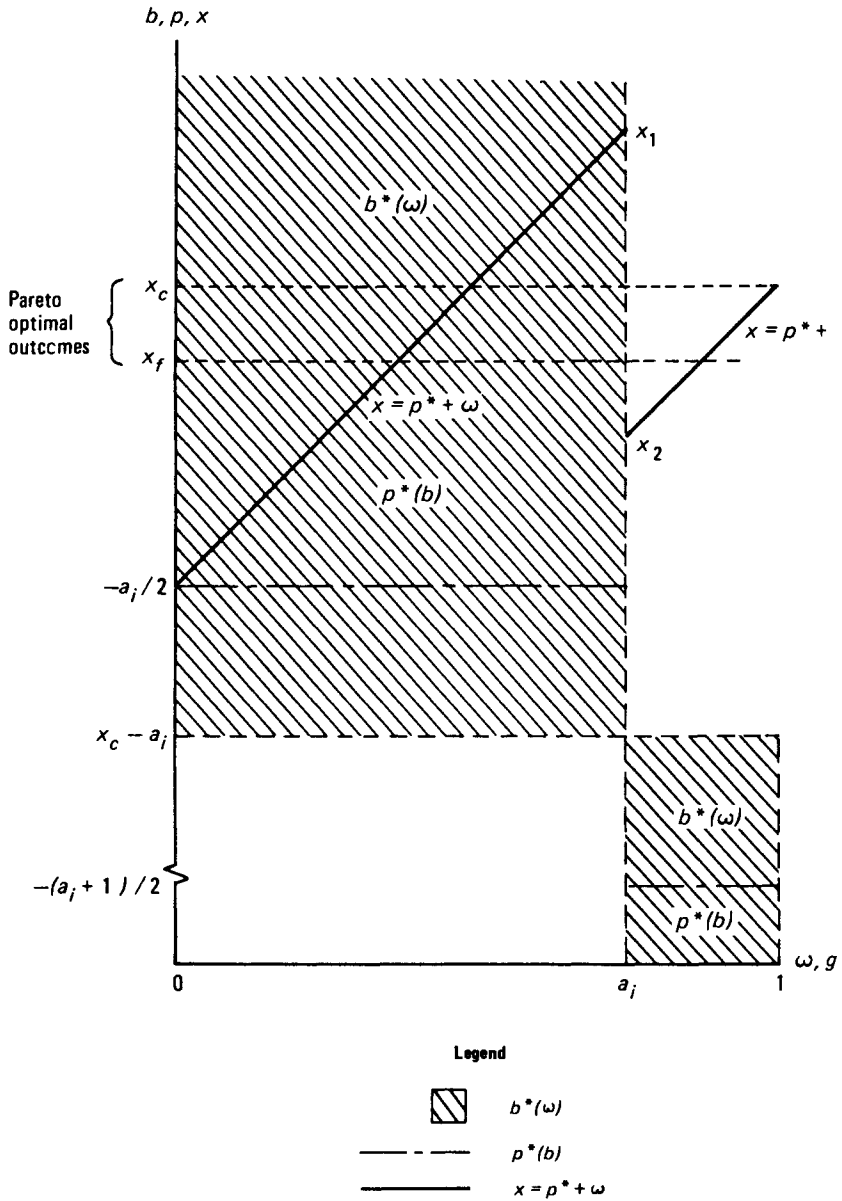
$$\begin{aligned}
 Eu_f \langle P^u | s = 1 \rangle &= -\frac{\sigma_\omega^2}{N^2} - \frac{x_c^2(N^2 - 1)}{3}, \\
 Eu_c \langle P^u | s = 1 \rangle &= -\frac{\sigma_\omega^2}{N^2} - \frac{x_c^2(N^2 - 1)}{3} - x_c^2 - k;
 \end{aligned}$$

c. outcomes are Pareto optimal if and only if

$$\omega \in [(a_i + a_{i+1})/2, x_c + (a_i + a_{i+1})/2], \quad i = 0, \dots, N - 1.$$

Figure 4 illustrates the legislative equilibrium and policy consequences for the legislative game $\langle P^u | s = 1 \rangle$. The noisy signaling equilibrium represents the maximum use of information given a rational floor actor who recognizes the committee’s incentive to use this information strategically. Since the committee has an incentive to report bills that cause the floor to infer that ω is smaller than it actually is, large bills signal small values of ω and are discounted heavily by the floor. These are represented by the upper shaded

equilibrium. Crawford and Sobel (1442–43) present other arguments as well. Moreover, considering coarser equilibria of the $\langle P^u | s = 1 \rangle$ game only exaggerates the differences between restrictive and unrestrictive procedures. A second source of nonuniqueness of the legislative equilibrium involves the floor’s beliefs and the committee’s bills. Since this form of non-uniqueness does not affect the relationship between ω and p^* , we view it as an inessential non-uniqueness and explore it no further. The reader should exercise caution, however, in using the current model to make inferences about committee behavior apart from that contained in the text (e.g., do committee proposals get amended?).



(See Proposition 2)

Figure 4. Legislative Equilibrium: Unrestrictive Procedure with Committee Expertise

region in figure 4 and corresponding wide interval of the random variable on the horizontal axis, $\omega \in [0, a_i]$. Small bills, in contrast, signal large ω somewhat more precisely. Thus, as shown by the lower shaded region, for any bill less than $x_c - a_i$, the floor can correctly infer that the random variable is in a relatively small interval, $\omega \in [a_i, 1]$.

A more concrete illustration of this signaling equilibrium is given by figure 4 and the following example. Let x_c refer to the change in farm income desired by a high-demand agriculture committee, x represent change in farm income, p represent change in government subsidies to farmers, and ω represent aggregate change in farm income from the nongovernmental sources. Suppose the committee possesses private information that ω is low. According to proposition 2, the committee reports a bill proposing large increases in subsidies. However, knowing the committee's incentive to understate ω (nongovernmental changes in farm income), the floor's inferences about ω are quite crude. In equilibrium, a bill proposing large increases in subsidies can correspond to any ω in a large interval. For high values of ω , however, the committee proposes relatively low change in governmental subsidies. This proposal allows the floor to make inferences about ω that are more precise than those possible given large proposed farm subsidies. Notice, however, that the floor is never able to infer the exact value of ω .

To illustrate more clearly why the bill, policy, and beliefs in proposition 2 represent equilibrium behavior, it is useful to look more closely at the floor's optimal policy (p^*) and beliefs (g^*) and the committee's optimal bill (b^*). The committee's optimal bill reflects the value of the random variable (which the floor does not know) and the committee's preferences (which the floor does know). In equilibrium, the floor must eliminate the bias from the implicit signal about the random variable in the committee's bill. If the floor believes that ω is in a given interval $(a_i, a_{i+1}]$, the policy that maximizes its expected utility is minus the midpoint of that belief interval $-(a_i + a_{i+1})/2$, because this policy yields an expected outcome at the floor's ideal point. For the two belief intervals in figure 4, these optimal policies are represented by the horizontal lines at $-a_i/2$ and $-(a_i + 1)/2$. Notice that the corresponding realized outcomes (the diagonal lines) are symmetrically distributed about the floor's ideal point (x_f) and are therefore unbiased.

A further requirement for equilibrium is that the floor's belief about the signal contained in the bill be based on rational behavior by the committee. Proposition 2a states that whenever $\omega \in (a_i, a_{i+1}]$, the committee reports a bill in $[x_c - a_{i+1}, x_c - a_i]$. This behavior is rational only if whenever the random variable lies exactly on a boundary of a partition ($\omega = a_i$), the committee is indifferent between the realized outcomes associated with floor's two optimal policies $-(a_i + a_{i+1})/2$ and $-(a_i + a_{i-1})/2$. These outcomes are shown in figure 4 as x_1 and x_2 , respectively. As required for an equilibrium, these points are equidistant from the committee's ideal point.

If the committee were not indifferent between these outcomes for all boundary points ($\omega = a_i$), then it would have an incentive to misrepresent the range in which ω is contained. The condition $a_i = a_{1i} + 2i(1 - i)x_c$ in proposition 2a guarantees this indifference and, along with the unbiased expectations of the floor, establishes that the behavior described in the proposition is an equilibrium.

The expected utilities in proposition 2b show that specialization can reduce the losses due to uncertainty. The extent of these informational benefits are closely related to the difference between floor and committee ideal points, as reflected by x_c in the expressions. The closer are the two points, the greater is the number of partitions. For example, for sufficiently extreme committee preferences (specifically, $x_c \geq 3\sigma_\omega^2$), the number of partitions (N) is one, and the equilibrium is the same as in $\langle P^u | s = 0 \rangle$. But for less extreme committee preferences ($x_c < 3\sigma_\omega^2$), the number of partitions increases and the floor is able to make more refined inferences about ω . These inferences continue to become more and more precise as committee and floor ideal points converge and the number of partitions approaches infinity.²⁹ *Ceteris paribus*, homogeneity of committee-floor preferences causes policymaking to become more informed and reduces the loss due to uncertainty. That is, as floor and committee ideal points coincide, more precise information is available during selection of policy, and expected utilities increase. Notice, however, that the possibility of greater use of the committee's private information still does not bias the outcomes toward the committee.

Similar to equilibrium outcomes in $\langle P^u | s = 0 \rangle$, the outcomes in $\langle P^u | s = 1 \rangle$ are not always Pareto optimal. Within any given partition, the realized outcomes are symmetrically distributed about x_f . Thus, at least half and typically more than half of the outcomes are not Pareto optimal. Still, in comparison to the $\langle P^u | s = 0 \rangle$ game, the ability of the floor to make even crude inferences enhances Pareto optimality. Generally, the likelihood of Pareto outcomes is increasing in the number of partitions which, in turn, is negatively related to the difference between the floor and committee ideal points.

The legislative game with unrestrictive procedures and committee specialization is consistent with other observations regarding the strategic use of information by standing committees.³⁰ Committee specialization is a necessary *but not sufficient* condition for informed decisionmaking by the parent body. Strategic use of information by committees constrains the committee's informational role. Moreover, in equilibrium, this constraining effect increases as committee and floor preferences diverge.

29. Although x_c enters the expected utility equations directly and indirectly (through \hat{N}), the expression $-\sigma_\omega^2/N^2 - x_c^2(N^2 - 1)/3$ is decreasing in x_c .

30. See, for example, Fenno's (1966) discussion surrounding the passage quoted in section 1.

4.3. EXPERTISE AND EFFICIENCY UNDER UNRESTRICTIVE PROCEDURES

The preceding analysis of the legislative games under unrestricted procedures provides a basis for addressing issues of committee expertise. Under what conditions does the committee acquire policy expertise under unrestricted amendment procedures, and what are the efficiency properties of this expertise equilibrium? Because the committee alone decides whether or not to specialize, the expertise equilibrium is determined simply by evaluating the expected utility of the committee under the two legislative games, $\langle P^u | s = 0 \rangle$ and $\langle P^u | s = 1 \rangle$. The committee specializes if and only if $Eu_c \langle P^u | s = 1 \rangle \geq Eu_c \langle P^u | s = 0 \rangle$. Proposition 3 identifies the expertise equilibrium and conditions for expertise efficiency under unrestricted amendment procedures.

Proposition 3. The properties of the P^u expertise game are:

- a. the committee's equilibrium specialization decision is

$$s^* = \begin{cases} 1 & \text{if } k \leq \bar{k}^u \\ 0 & \text{otherwise;} \end{cases}$$

- b. the game is expertise efficient if and only if

$$k < \bar{k}^u \text{ or } k > 2\bar{k}^u,$$

$$\text{where } \bar{k}^u = \sigma_\omega^2 \left(1 - \frac{1}{N^2} \right) - \frac{x_c^2(N^2 - 1)}{3}.$$

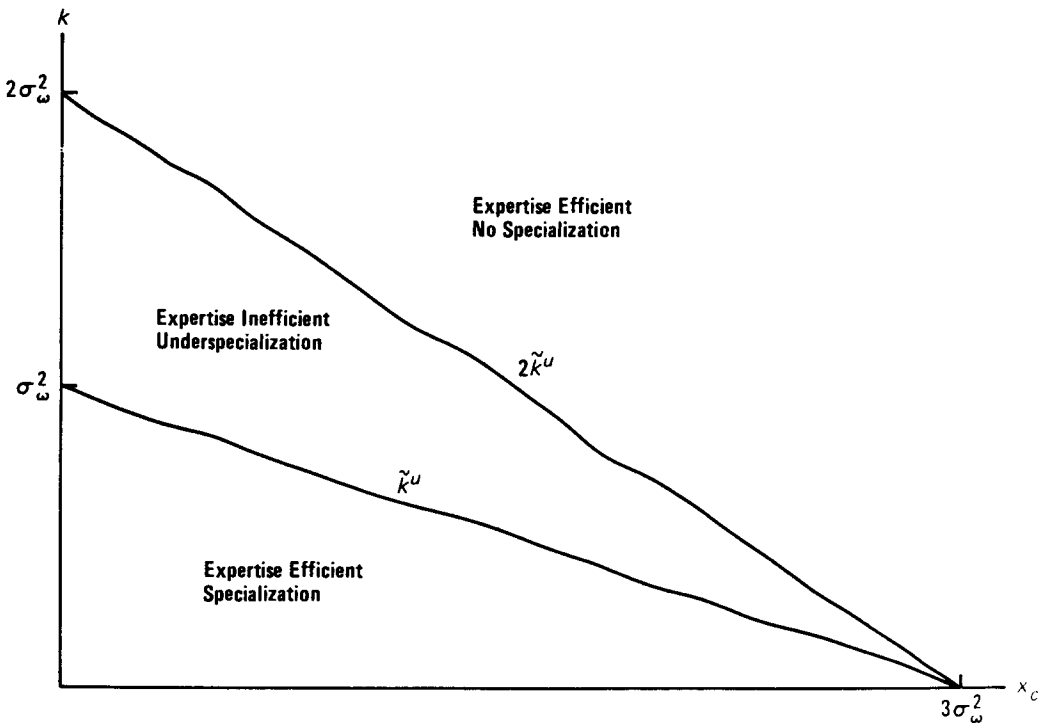
The term \bar{k}^u is derived from the expected utility expressions in propositions 1 and 2³¹ and has two intuitive interpretations. First, for each actor it represents the informational gain from committee specialization under the unrestricted procedure. That is, given equilibrium behavior under P^u , \bar{k}^u represents the increment in utility that the committee and floor acquire from the presence of (asymmetric) information. Second, for the committee the term can also be interpreted as the cost at which the committee is indifferent between specializing and not specializing. For $k \geq \bar{k}^u$, the committee's expected benefits from specializing are exceeded by the cost; therefore it will not specialize. For $k < \bar{k}^u$, the converse holds.

Obviously, the number of noisy signalling intervals (N) must exceed one for the committee to specialize, since if $N = 1$, the condition in proposition 3a reduces to $k < 0$ which, by assumption, cannot hold. However, $N > 1$ is not sufficient for specialization because the increment in expected utility for the

31. Formally, $\bar{k}^u = Eu_i \langle P^u | s = 1 \rangle - Eu_i \langle P^u | s = 0 \rangle$ for $i = c, f$ (net of k in the case of the committee).

committee in the corresponding partition equilibrium (\tilde{k}^u) must also exceed the committee's cost of specialization. As this cost becomes large and/or as the benefit from the partition equilibrium becomes small, specialization will not occur and joint gains from legislative specialization are forgone in equilibrium.

The expertise efficiency properties of the unrestrictive procedure are illustrated in figure 5. For $k \leq 2\tilde{k}^u$, the committee should always specialize according to the efficiency criterion. However, the committee will specialize



Legend

$$\tilde{k}^u = \sigma_{\omega}^2 \left(1 - \frac{1}{N^2}\right) - \frac{x_c^2 (N^2 - 1)}{3}$$

(See Proposition 3)

Figure 5. Expertise Equilibrium under Unrestrictive Procedure

only when $k \leq \bar{k}^u$. Because the self-interested committee ignores the gains to the floor from specialization, the committee often “underspecializes” by choosing not to acquire expertise even though it would be used to the benefit of the parent body. Finally, for $k > 2\bar{k}^u$, the committee again does not specialize. For costs this great, however, the expected joint benefits do not merit specialization, thus nonspecialization is expertise efficient.

The expertise efficiency limitations of P^u result from the asymmetry in the distribution of the benefits and costs from specialization. The benefits (\bar{k}^u) accrue symmetrically to the floor and the committee in terms of equilibrium policies that reduce uncertainty. But the costs (k) are borne entirely by the committee. Because the committee receives no distributional compensation for incurring costs to acquire information—that is, because expected outcomes remain at the floor’s ideal point under both games ($P^u|s = 0$) and ($P^u|s = 1$)—it is not surprising that the committee often chooses not to specialize even though specialization would enhance the joint utility of the decisionmakers.

5. RESTRICTIVE AMENDMENT PROCEDURES

This section identifies legislative equilibria for the two legislative games ($\langle P^r|s = 0 \rangle$ and $\langle P^r|s = 1 \rangle$) and the expertise equilibrium for the restrictive amendment procedure (P^r). This procedure limits the floor’s choice of policy to $\{b, p_o\}$, where p_o is the status quo policy. The section also presents the expected utilities in the P^r games and assesses Pareto optimality and expertise efficiency.

5.1. RESTRICTIVE PROCEDURES WITHOUT COMMITTEE EXPERTISE

The legislative equilibrium for $\langle P^r|s = 0 \rangle$ depends on the status quo policy, p_o , which yields an outcome $x = p_o + \omega$.³² As under unrestrictive procedures, the floor observes that the committee has no private information and thus cannot make inferences about ω from the committee’s bill. Unlike P^u , however, the floor is constrained to choose between p_o and b . The floor chooses the policy that maximizes its expected utility given its prior beliefs about ω . The committee, therefore, proposes a bill that maximizes its expected utility subject to the constraint that the floor’s expected utility is at least as great as it would be under the status quo. Proposition 4 identifies the legislative equilibrium, the floor and committee expected utilities, and the Pareto optimality of the realized outcomes for $\langle P^r|s = 0 \rangle$.

32. See Romer and Rosenthal for a similar spatial model.

Proposition 4. For the legislative game $\langle P^r | s = 0 \rangle$,

a. the legislative equilibrium is

$$\begin{aligned}
 b^* &= \begin{cases} x_c - \bar{\omega} & \text{if } p_o \leq -x_c - \bar{\omega} \text{ or } p_o \geq x_c - \bar{\omega}, \\ -p_o - 1 & \text{if } p_o \in (-x_c - \bar{\omega}, -\bar{\omega}), \\ b' & \text{if } p_o \in [-\bar{\omega}, x_c - \bar{\omega}), \\ & \text{where } b' \in P \text{ s.t. } Eu_f(b') \leq Eu_f(p_o), \end{cases} \\
 p^*(b) &= \begin{cases} b & \text{if } Eu_f(b) \geq Eu_f(p_o), \\ p_o & \text{otherwise,} \end{cases} \\
 g^*(b) &= \{\omega | \omega \in [0, 1]\};
 \end{aligned}$$

b. for $p_o = -\bar{\omega}$, the expected utilities are

$$\begin{aligned}
 Eu_f(P^r | s = 0) &= -\sigma_\omega^2, \\
 Eu_c(P^r | s = 0) &= -\sigma_\omega^2 - x_c^2;
 \end{aligned}$$

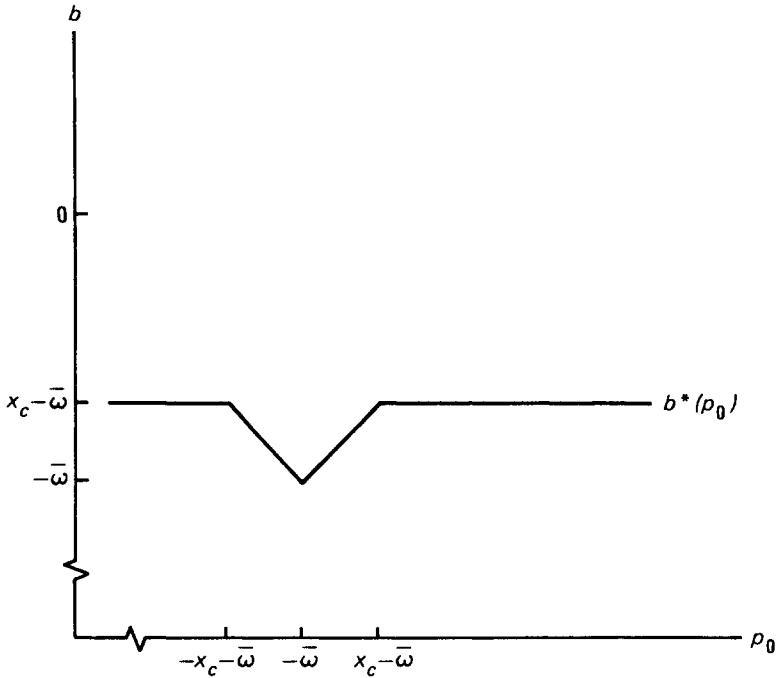
c. for $p_o = -\bar{\omega}$,³³ outcomes are Pareto optimal if and only if

$$\omega \in [\bar{\omega}, x_c + \bar{\omega}].$$

The legislative equilibrium under $\langle P^r | s = 0 \rangle$ is identical to $\langle P^u | s = 0 \rangle$ with the following exception. The optimal bill (b^*) and policy (p^*) are functions of the status quo point (p_o). Consequently, figure 6 differs from previous figures of legislative equilibria by graphing proposals as a function of the status quo point. For a status quo point equal to $-\bar{\omega}$, behavior and beliefs are identical to that in the analogous game under unrestrictive procedures, $\langle P^u | s = 0 \rangle$ (see figure 3). As in the legislative game under unrestrictive procedures and without specialization ($\langle P^u | s = 0 \rangle$), the committee's behavior is inconsequential. Regardless of what bill is reported, the floor adopts the status quo policy, because p_o yields an expected outcome that is closer to the floor's ideal point.

However, for extreme values of p_o (specifically, $p_o \in [-\bar{\omega}, x_c - \bar{\omega})$), the committee's optimal proposal is accepted by the floor. Although the floor

33. The assumption that $p_o = -\bar{\omega}$ simplifies the calculations and facilitates comparison of the legislative equilibria under P^u and P^r . This status quo point has several reasonable properties. It is the legislative equilibrium for $\langle P^u | s = 0 \rangle$, and it is stable against other bills or amendments in games $\langle P^u | s = 0 \rangle$, and $\langle P^r | s = 0 \rangle$. Furthermore, the expected outcome from the policy $p = -\bar{\omega}$ is the floor's ideal point.



Legend

———— $b^*(\rho_0)$

(See Proposition 4)

Figure 6. Legislative Equilibrium: Restrictive Procedure without Committee Expertise

expects the bill to yield an outcome equal to x_c , it expects to do worse under p_0 . Thus, even though uncertainty is symmetric, the committee can reap benefits from extreme values of p_0 because of the restrictions on the floor's opportunities to amend. These possible distributional benefits to the committee under P^r are realized more generally in the next and final legislative game.

5.2. RESTRICTIVE PROCEDURES WITH COMMITTEE EXPERTISE

The legislative equilibrium for $\langle P^r | s = 1 \rangle$ also depends on the status quo point, p_0 . However, it differs from the $\langle P^u | s = 1 \rangle$ equilibrium in one important respect. For extreme values of the random variable (specifically, $\omega \leq$

$-3x_c - p_o$ and $\omega \geq x_c - p_o$), the floor can infer the precise value of ω from the committee's bill. Even though the resulting policy is equal to the committee's ideal point, the floor prefers this outcome to that yielded by the status quo. In contrast, for moderate values ($\omega \in [-3x_c - p_o, x_c - p_o]$) noisy signaling again occurs. Then the floor does not prefer outcomes at the committee's ideal point to those given by the status quo and, as in $\langle P^u | s = 1 \rangle$, the committee has an incentive to cause the floor to infer a smaller value of ω . Thus, in this range no legislative equilibrium exists in which the floor can make exact inferences about ω . Proposition 5 identifies a legislative equilibrium, the floor and committee expected utilities, and the Pareto optimality of the realized outcomes for $\langle P^r | s = 1 \rangle$.

Proposition 5. For the legislative game $\langle P^r | s = 1 \rangle$,

a. the legislative equilibrium is

$$b^*(\omega) = \begin{cases} x_c - \omega & \text{if } \omega \in [0, -3x_c - p_o) \text{ or } \omega \in [x_c - p_o, 1], \\ 4x_c + p_o & \text{if } \omega \in [-3x_c - p_o, -x_c - p_o], \\ b \in (p_o, p_o + 4x_c] & \text{if } \omega \in (-x_c - p_o, x_c - p_o); \end{cases}$$

$$p^*(b) = \begin{cases} b & \text{if } b \in [p_o + 4x_c, x_c] \text{ or } b \in [x_c - 1, p_o] \\ & \text{or } b \in (x_c, -p_o] \text{ or } b \in [p_o - 1, x_c - 1), \\ p_o & \text{otherwise;} \end{cases}$$

$$g^*(b) = \begin{cases} x_c - b & \text{if } b \in (p_o + 4x_c, x_c] \text{ or } b \in [x_c - 1, p_o], \\ \{\omega | \omega \in [-3x_c - p_o, -x_c - p_o]\} & \text{if } b = p_o + 4x_c, \\ \{\omega | \omega \in (-x_c - p_o, x_c - p_o)\} & \text{if } b \in (p_o, p_o + 4x_c), \\ 0 & \text{if } b > x_c, \\ 1 & \text{if } b < x_c - 1; \end{cases}$$

b. the expected utilities are

$$Eu_f \langle P^r | s = 1 \rangle = -\sigma_\omega^2 (4x_c)^3 - x_c^2,$$

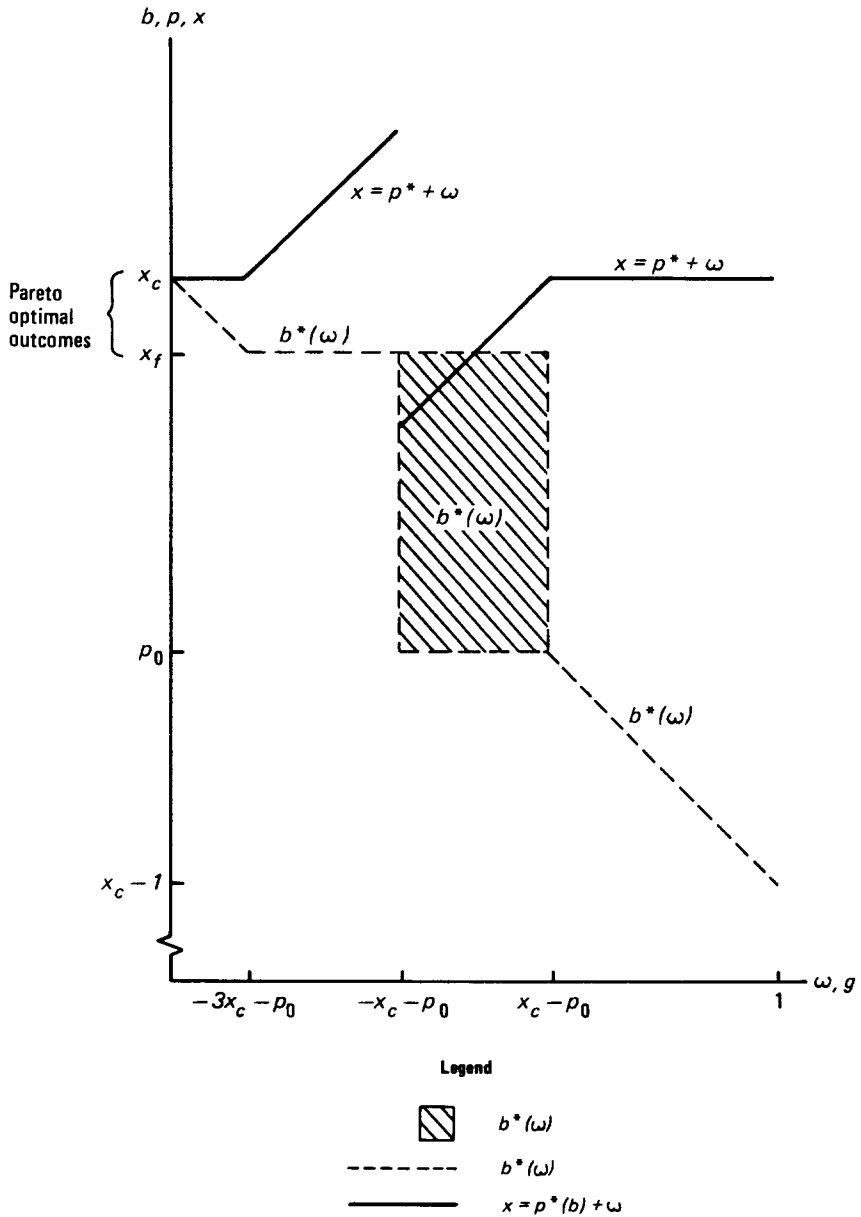
$$Eu_c \langle P^r | s = 1 \rangle = -\sigma_\omega^2 (4x_c)^3 - k;$$

c. for $p_o = -\bar{\omega}$, outcomes are Pareto optimal if and only if

$$\omega \in [0, \bar{\omega} - 3x_c] \text{ or } \omega \in [\bar{\omega}, 1].$$

Figure 7 illustrates a legislative equilibrium and outcomes for $\langle P^r | s = 1 \rangle$.³⁴ The committee's optimal bill (b^) is shown by the dotted line and shaded*

34. In the figure, $p_o + 4x_c = x_f$. This is not true in general, however.



(See Proposition 5)

Figure 7. Legislative Equilibrium: Restrictive Procedure with Committee Expertise

area. The different bills for different values of the random variable illustrate that for moderate values of ω , the floor cannot infer the precise value of ω from the committee's bill. This is similar to the analogous result under P^u , namely, that specialization does not guarantee informed decisionmaking. The equilibrium for the $\langle P^r | s = 1 \rangle$ game has several important differences from equilibria of previous games, however. First, the expected outcome equals the committee's ideal point. That is, in contrast to the unrestrictive procedure, the restrictive procedure confers distributional benefits to the committee. Second, for more extreme values of the random variable, the floor can make precise inferences from the committee's bill, unlike in all previous games. Third, when the floor can make such inferences, the committee's bill is always certain to yield an outcome at the committee's ideal point. Nevertheless, the floor accepts the bill because the outcome under the status quo is worse and, of course, because the restrictive procedure prohibits amendment. In sum, the equilibrium reflects the significant, pro-committee distributional properties of the restrictive procedure.

The expected utility of the floor in $\langle P^r | s = 1 \rangle$ reflects a distributional loss ($-x_c^2$). Recall that in all previous games this term entered into the committee's expected utility. The common term in the expected utility expressions ($-\sigma_\omega^2(4x_c)^3$) represents the informational properties of P^r . As in P^u , for sufficiently small x_c (specifically $x_c < 3\sigma_\omega^2$), specialization results in net gains for both actors. Furthermore, these gains are decreasing in x_c , so the greater is the difference between floor and committee preferences, the smaller are the informational benefits from specialization under P^r . The key unanswered question is whether and when the distributional losses the floor suffers under P^r are offset by the informational gains. Prerequisite to answering this question is derivation of conditions under which the committee specializes under P^r .

5.3. EXPERTISE AND EFFICIENCY UNDER RESTRICTIVE PROCEDURES

Given a restrictive procedure, when will the committee choose to acquire policy expertise? By assumption, the committee specializes if and only if $Eu_c(P^r | s = 1) \geq Eu_c(P^r | s = 0)$. Proposition 6 identifies the expertise equilibrium and the conditions for expertise efficiency under the restrictive procedure.

Proposition 6. The properties of the P^r expertise game are;

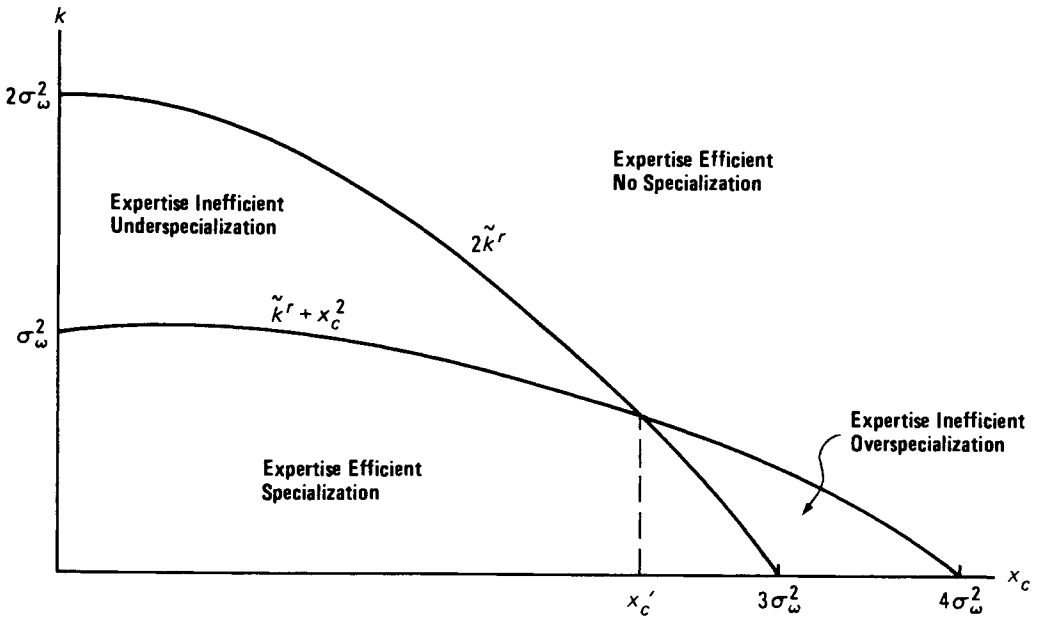
- a. the committee's equilibrium specialization decision is

$$s^* = \begin{cases} 1 & \text{if } k \leq \bar{k}^r + x_c^2, \\ 0 & \text{otherwise;} \end{cases}$$

b. the game is expertise efficient only if

- (i) $x_c \leq x'_c$ and either $k \geq 2\tilde{k}^r$ or $k \leq \tilde{k}^r + x_c^2$, or
 - (ii) $x_c > x'_c$ and either $k \leq 2\tilde{k}^r$ or $k \geq \tilde{k}^r + x_c^2$,
- where $\tilde{k}^r = \sigma_\omega^2[1 - (4x_c)^3]$, and x'_c solves $\tilde{k}^r = (x'_c)^2$.

As illustrated in figure 8, the committee is willing to incur a cost equal to $\tilde{k}^r + x_c^2$ to specialize. This expression is derived from propositions 4 and 5 and represents the expected gain for the committee in $\langle P^r | s = 1 \rangle$ relative to $\langle P^r | s = 0 \rangle$. The gain consists of the distributional component, x_c^2 , and an informational component, \tilde{k}^r . Analogous to \tilde{k}^u above, the informational component, \tilde{k}^r , reflects the expected gain to both actors from decisionmaking



Legend

$$\tilde{k}^r = \sigma_\omega^2 [1 - (4x_c)^3]$$

$$\tilde{k}^r(x'_c) = (x'_c)^2$$

(See Proposition 6)

Figure 8. Expertise Equilibrium under Restrictive Procedure

under P^r with specialization. However, because of the pro-committee distributional consequences of P^r , the committee's incentive to specialize is stronger than the common informational term alone reflects.

The expertise equilibrium under P^r exhibits some of the same characteristics as the equilibrium under P^u . A moderate committee ($x_c \leq x'_c$) may choose to specialize too seldom for relatively moderate costs of specialization (specifically, $k \in (\bar{k}^r + x_c^2, 2\bar{k}^r)$). Similar to P^u , P^r yields underspecialization because the committee disregards the benefits that the floor obtains from reduction in uncertainty. However, for more extreme committees ($x_c > x'_c$), the expertise equilibrium under P^r differs significantly from that under P^u (compare figure 5). In this interval the committee overspecializes for some k because the distributional gain to the committee increases in x_c , while the informational gains decreases in x_c . Indeed, for $x_c > 3\sigma_\omega^2$, the informational gains are nil. Finally, as in the P^u expertise game, for very high costs of specialization ($k < 2\bar{k}^r$ if $x_c \leq x'_c$, and $k > \bar{k}^r + x_c^2$ if $x_c > x'_c$), the committee's choice not to specialize is expertise efficient.

6. EQUILIBRIUM OF THE PROCEDURAL GAME

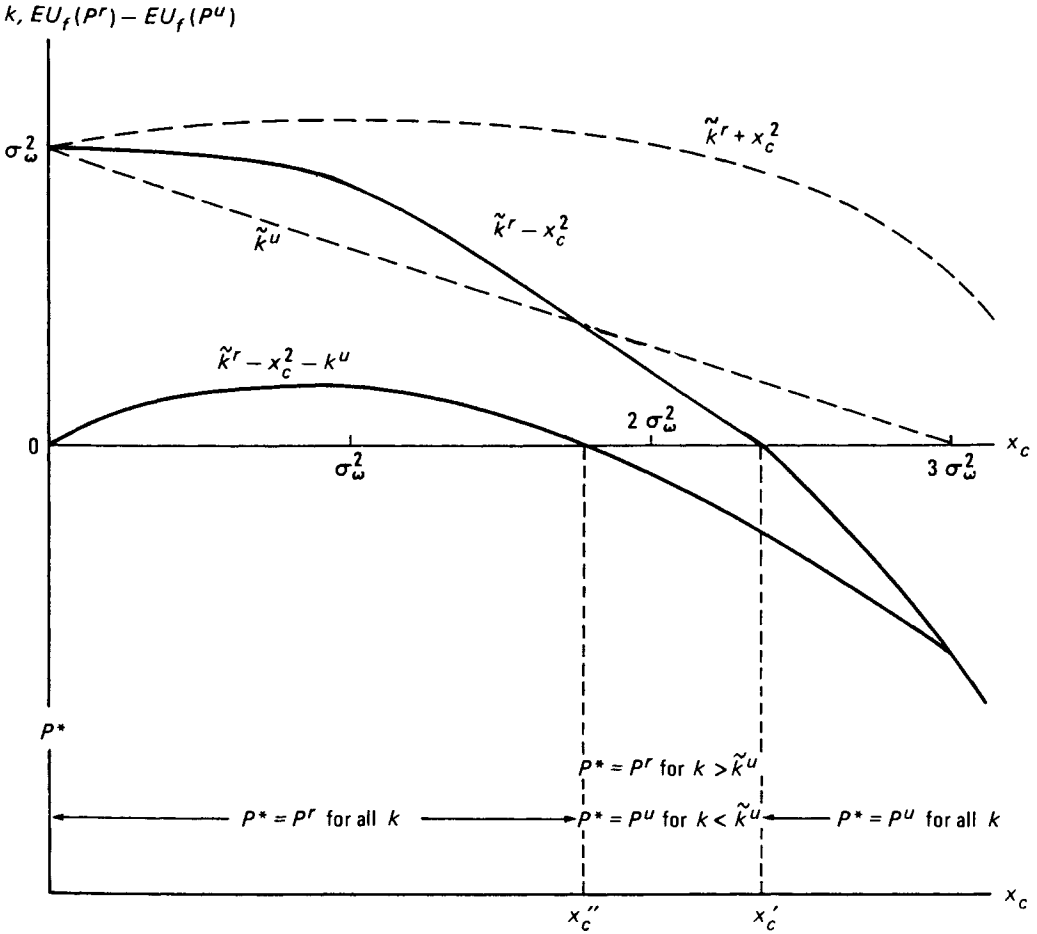
The comparative analyses of amendment procedures presented above identify some normative properties of legislative and expertise equilibria, namely, (ex post) Pareto optimality of legislative games and (ex ante) expertise efficiency of expertise games. In this section we address the central, positive concern of the paper. Given the parent chamber's ability to engage in procedural as well as policy choices, under what conditions will it choose to restrict its ability to amend committee bills? Proposition 7 summarizes the floor's choice of procedure as a function of the parameters of the model, x_c and k .

Proposition 7. The equilibrium of the procedural game is:

$$P^* = \begin{cases} P^r & \text{if } x_c \leq x''_c, \\ P^r & \text{if } x_c \in (x''_c, x'_c) \text{ and } k > \bar{k}^u, \\ P^u & \text{if } x_c \in (x''_c, x'_c) \text{ and } k < \bar{k}^u, \\ P^u & \text{if } x_c \geq x'_c. \end{cases}$$

where x''_c solves $\bar{k}^r = \bar{k}^u + (x''_c)^2$ and x'_c solves $\bar{k}^r = (x'_c)^2$.

Figure 9 illustrates the proposition. The horizontal axis, x_c , represents the difference between the ideal points of the committee and the floor. The vertical axis measures the committee's cost of specialization (k) and the utility differential to the floor of the restrictive versus unrestrictive procedures ($Eu_f(P^r) - Eu_f(P^u)$) for a given specialization decision. The dotted curves represent specialization indifference of the committee. The top dotted curve ($\bar{k} + x_c^2$) is the cost at which the committee is indifferent between specializing



Legend

$$\tilde{k}^u = \sigma_\omega^2 \left(1 - \frac{1}{N^2}\right) - \frac{x_c^2 (N^2 - 1)}{3}$$

$$\tilde{k}^r(x_c'') = (x_c'')^2 + k^u(x_c'')$$

$$\tilde{k}^r = \sigma_\omega^2 [1 - (4x_c)^3]$$

$$\tilde{k}^r(x_c') = (x_c')^2$$

- floor utility differential
- - - - committee specialization indifference

(See Proposition 7)

Figure 9. Procedural Equilibrium

and not specializing under P^r (see proposition 6 and figure 8). The bottom dotted curve (\bar{k}^u) has the same interpretation for P^u (see proposition 3 and figure 3). The solid curves represent the floor's preference over procedure in the form of utility differential curves which are derived from propositions 1, 2, 4, and 5. Whenever the expression is positive (negative), the floor prefers the restrictive (unrestrictive) procedure.³⁵ The relevant utility differential curve is given by the committee's specialization decision. For example, for costs at which the committee specializes under either procedure ($k \leq \bar{k}^u$), the appropriate utility differential curve is $\bar{k}^r - x_c^2 - \bar{k}^u$, which illustrates that the restrictive (unrestrictive) procedure will be chosen for all $x_c \leq x_c''$ ($x_c > x_c''$). Thus, the specialization indifference and utility differential curves illustrate the procedural equilibrium.

With these preliminaries, the interpretation of proposition 7 is straightforward. The proposition states the procedural equilibrium over three intervals of x_c . For concreteness, committees are regarded as "moderate" when $x_c \leq x_c''$, "extreme" when $x_c \in (x_c'', x_c')$, and "very extreme" when $x_c \geq x_c'$.

First, for all moderate committees ($x_c \leq x_c''$), the floor prefers the restrictive to unrestrictive procedure, regardless of the cost of specialization. For costs such that specialization occurs under both procedures ($k \leq \bar{k}^u$), the informational gains from P^r over P^u ($\bar{k}^r - \bar{k}^u$) outweigh the distributional losses from P^r ($-x_c^2$), as shown by the bottom utility differential curve ($\bar{k}^r - x_c^2 - \bar{k}^u \geq 0$). For moderate committees, decisionmaking is so much more informed and the distributional losses are so low under P^r that even when P^r is not needed to induce the committee to specialize, the floor is still better off by choosing P^r . For somewhat larger costs such that specialization occurs only under P^r ($\bar{k}^u < k \leq \bar{k}^r + x_c^2$), the informational gain from P^r over P^u (\bar{k}^r) is larger than the distributional losses of P^r ($-x_c^2$), as shown by the upper utility differential curve ($\bar{k}^r - x_c^2$). For moderate committees, the ability of the floor to induce the committees to specialize under P^r when they would not under P^u always results in a substantial increase in the floor's expected utility. Finally, for costs so large that specialization is absent under both procedures, the floor's payoff is unaffected by its procedural choice. Thus, for moderate committees, the floor is weakly better off by adopting restrictive procedures.

Second, for more extreme committees ($x_c \in (x_c'', x_c')$), the floor's choice of a particular procedure depends on specialization costs, k . For costs that induce specialization under both procedures ($k \leq \bar{k}^u$), the informational gains from P^r over P^u are less than the distributional losses from P^r , as shown by the bottom utility differential curve ($\bar{k}^r - x_c^2 - \bar{k}^u < 0$). For extreme committees, the informational gains to the floor from P^r are not sufficient to offset the distributional loss of P^r whenever the committee would have specialized under either procedure. However, for costs such that specializa-

35. Strict equality of the utility differential will be characterized as weak preference for a procedure.

tion occurs only under P^r ($\bar{k}^u < k \leq \bar{k}^r + x_c^2$), the informational gain from P^r over P^u is larger than the distributional losses of P^r , as shown by the upper utility differential curve ($\bar{k}^r - x_c^2$). Thus, for extreme committees, the ability of the floor to induce the committees to specialize under P^r when they would not under P^u always results in an increase in the floor's expected utility. Finally, for costs so large that specialization is absent under both procedures, the floor's expected utility is unaffected by its procedural choice. Thus, for extreme committees, the floor is (at least weakly) better off choosing the restrictive procedures for $k > \bar{k}^u$ and is strictly better off choosing the unrestrictive procedure for $k \leq \bar{k}^u$.

Third, for very extreme committees ($x_c \geq x_c'$), the floor prefers the unrestrictive to the restrictive procedure, regardless of the cost of specialization. For costs such that specialization occurs under both procedures ($k \leq \bar{k}^u$), the informational gains from P^r over P^u are less than the distributional losses from P^r , as shown by the bottom utility differential curve ($\bar{k}^r - x_c^2 - \bar{k}^u < 0$). For very extreme committees, the informational gains to the floor from P^r are not sufficient to offset the distributional losses of the P^r whenever the committee would have specialized under either procedure. For specialization costs such that specialization occurs only under P^r ($\bar{k}^u < k \leq \bar{k}^r + x_c^2$), the informational gain from P^r over P^u is smaller than the distributional losses of P^r , as shown by the upper utility differential curve ($\bar{k}^r - x_c^2$). For very extreme committees, the ability of the floor to induce the committees to specialize under P^r when it would not under P^u does not enhance the floor's expected utility. Finally, for costs so large that specialization is absent under both procedures, the floor's expected utility is unaffected by its procedural choice. Thus, for very extreme committees, the floor is weakly better off adopting the unrestrictive procedure.

In summary, proposition 7 and figure 9 build on propositions 1–6 to establish the main result of the paper. Under a wide range of conditions, the choice of restrictive procedures is a rational response by a parent chamber that needs information and relies upon standing committees to acquire it. As long as the preferences of the committee and the parent chamber are not extremely divergent, the parent chamber prefers to restrict its ability to amend its committees' proposals. Furthermore, even when discrepancies in preferences are extreme, it may be in the parent chamber's interest to adopt restrictive procedures to induce the committee to specialize. Generally, however, the value of restrictive procedures to the parent chamber diminishes as the preferences of the committee and parent chamber diverge.

7. DISCUSSION

The dominant focus of the paper has been on the informational role of committees, more specifically on a committee's incentive to acquire expertise which, in equilibrium, may be used beneficially. This discussion elaborates on

several empirical implications of the model, first for the nineteenth-century procedural puzzle posed in section 2, then for congressional politics more broadly, and finally for generic issues of collective choice in institutions with endogenous procedures.

The proposed solution to the historical puzzle concerning the dramatic increase in the use of restrictive procedures in the nineteenth-century House stems from the focus on decisionmaking under uncertainty. *Ceteris paribus*, the subtle but salutary effects of restrictive procedures ought to be especially compelling in times of policy innovation when, almost by definition, the relationship between policies and their consequences is not well known. According to several measures and historical accounts, the late nineteenth century was precisely such a period of change and uncertainty. Economic change was broadly reflected by dramatic shifts in the regional distribution of population.³⁶ Urbanization of the population also accelerated (Chandler:6), industrial and agricultural productivity soared (Keller), national markets for consumer and producer goods arose (Chandler), and modern financial and corporate institutions also appeared and became important elements in a growing national economy (Davis; Chandler; Keller).

Congress played a major part in these changes. Keller, for example, relates abrupt changes in the social, economic, and political environment to increasing congressional activities and to the need for legislative specialization.

Garfield thought that the work of Congress in 1877 was ten times heavier and more complicated than it had been forty years before. Twelve annual appropriations bills occupied two-thirds of each session, when a generation earlier they had been dealt with in a week. *The business that came before Congress inexorably grew*: 37,409 public and private bills were introduced from 1871 to 1881; 73,857 from 1881 to 1891; 81,060 from 1891 to 1901. The Congressional Globe of 1839–1840 had 1,405 pages; the Congressional Record of 1889–1890 was 11,568 pages long. The sheer weight and diversity of interests made tariff scheduling an *increasingly complicated and technical process*. The Rivers and Harbors appropriations bill of 1888 took care of individual congressmen's interests in traditional pork barrel fashion; but its drafters also had to take into account detailed surveys and estimates submitted by local engineers, the chief of army engineers, and the secretary of war. By the end of the century permanent expenditures were allocated through 185 separate acts, including 13 major annual appropriations bills (300–01, emphasis added).

In sum, an apt modification of Woodrow Wilson's quotation introducing section 2 is that the late nineteenth-century Congress had indeed become a "business body" and restrictive procedures better enabled it to "get its business done."³⁷

36. For example, Easterlin (76) presents demographic data showing that in seven of nine geographic regions, the regional share of national population changed more in the three decades, 1870–1900, than in the following *five* decades, 1900–1950.

37. Of course, other congressional change coincided with the marked procedural changes in the late nineteenth century Congress. Most notable of these were changes in the party system (Brady) and in congressional careerism (Price; Fiorina et al). We view these as wholly consistent with our admittedly narrower focus on procedures but have largely ignored them

Proposition 7 specifies the precise and surprisingly weak conditions under which restrictive procedures can lead to committee specialization *and* to relatively informed decisionmaking on the floor. It should be noted, however, that restrictive procedures are not the sole solution to institutional problems posed by decisionmaking under uncertainty. Nor does the model ignore two additional key parameters of institutional design. Results similar to those presented above can also be derived for x_c and \bar{k} , that is, the degree to which the committee has preference outliers and the cost the committee must bear to specialize. In legislative settings, for example, the parent chamber (or party leaders) make committee assignments and allocate resources to committees. Thus, x_c and \bar{k} have natural, substantive interpretations that yield testable implications. One limitation of restrictive procedures is that when the costs the committee must bear to acquire information become excessive ($k > \bar{k}^r + x_c^2$ in figure 9), P^r alone cannot induce the committee to gather information, even though by proposition 6 specialization might be expertise efficient. In such cases, the parent chamber has an obvious incentive to subsidize the committee's informational activities and/or to alter the committee's composition thereby changing the strategic situation to an (x_c, k) with $k < \bar{k}^r + x_c^2$. An empirical example is available from the contemporary Congress. In the 1970s when there was a widely perceived demand for national energy legislation, several sessions of Congress nevertheless ended without passage of such legislation. The House's solution to the problem contained all three elements of legislative design reflected in the model: k , x_c , and P . First, an Ad Hoc Committee on Energy was established and given special staff, thus lowering the costs of information gathering.³⁸ Second, the composition of the committee was more moderate than many of the committees that shared jurisdiction on energy policy (Oppenheimer: 287–88). Third, after the jointly referred legislation was assembled by the Ad Hoc Committee and prepared for floor consideration, a modified rule was assigned that restricted amendments to those offered by the Ad Hoc Committee.³⁹ In terms of figure 9, these actions can be summarized as a southwesterly shift of the (x_c, k) situation. Their final effect, more or less consistent with the model, was significant committee

because of the difficulty in disentangling the complex and probably reciprocal relationships between parties, restrictive procedures, and careerism. For example, strong parties make restrictive procedures easier to execute and, once executed successfully, easier for backbenchers (as beneficiaries) to stomach. Similarly, the enhanced ability of Congress to pass major legislation reinforced the willingness of legislators to adopt legislative politics as their careers and to confer benefits to constituents in sufficient quantities to make careerism not only desirable but also feasible (via reelection).

38. Some staff were new hires; others were borrowed from other committees (*Congressional Quarterly Almanac*, 1977: 721). Also, the Ad Hoc Committee consisted of subcommittee chairmen from various committees that shared jurisdiction on, and previously had fought over, energy policy. This gave the Ad Hoc Committee a comparative advantage in energy expertise.

39. See H.R. 797, *Final Calendar of the Committee on Rules*, 95th Congress, 1978: 43.

activity and final passage of national energy legislation (Oppenheimer; Vogler).

Another implication of the model concerns the long-standing interest of legislative scholars in the relationship between committees and their parent chamber.⁴⁰ Beginning with early research,⁴¹ most studies suggest that the influence of committees on policies is substantial. More recently, much of the literature attributes disproportionate committee influence to procedures, such as those governing the initiation, consideration, and final approval of legislation.⁴² One claim in these studies is that "the explanation of committee power resides in the rules governing the sequence of proposing, amending, and especially of vetoing in the legislative process" more than in "information and expertise" (Shepsle and Weingast: 86, 87). Such arguments seem premature, however, given two limitations of the models on which they are based. First, information and expertise, while sometimes doubted as foundations of committee power, are not modeled in these studies. Second, neither is the choice of the rules governing the sequence of decisionmaking. This study shows that addressing these limitations yields a revised conclusion regarding committee power, information, and expertise. In particular, the equilibrium to the game with incomplete information and procedural choice suggests that committee power can be derived from information and expertise and may be substantial. However, in light of the parent chamber's ability to choose procedures, committee power will exist only to the extent that it is congruent with the informational needs and policy preferences of the parent chamber.

Because these empirical implications and substantive conclusions are derived from a model that is quite stylized, we conclude by reconsidering its assumptions and associated caveats. First, several assumptions were made only to simplify the derivation of the propositions and are not critical to the qualitative claims.⁴³ However, two assumptions are central to the results. First and obviously, incomplete information is a necessary ingredient in the argument. The corresponding caveat is simply that the model does not pertain to collective decisionmaking under conditions of perfect information. The *informational* rationale for restrictive procedures therefore is only one rationale and should not be viewed as inconsistent with others.⁴⁴ Second, the

40. See Eulau and McCluggage for an extensive review of this literature.

41. See, for example, Wilson (1885) and Luce.

42. See, for example, Shepsle (1979) and Denzau and Mackay on gatekeeping powers under open rules, Gilligan and Krehbiel (1988) on bundling strategies under complex rules, and Shepsle and Weingast (1987) on restrictive conference procedures.

43. For example, the quadratic utility functions are not necessary; all that is required is strict quasi-concavity of utility over policy consequences. The independence of the costs borne by the committee to observe ω , too, is unimportant; extensions in which the parent chamber shares in these costs (e.g., by appropriating funds for staff) would be simple.

44. See, for example, Bach (1981); Fenno (1974); Manley; Oleszek; M. Robinson; and Krehbiel. Of these, the informational rationale seems particularly consistent with conventional accounts of closed rules based on "complexity of the issues." If by "complexity," Fenno, Manley, and Robinson mean uncertainty regarding the relationship between policies and conse-

sequence of the game is such that the parent chamber selects a procedure initially, with no opportunity to alter its choice later in the process. This is contrary to the literal sequence of decisionmaking in the House of Representatives, for example, where special orders are written by the Rules Committee and voted by the parent chamber subsequent to the committee's reporting its bill. The assumption that the parent chamber can commit to procedures, while rigid, has two sets of defenses. The theoretical defense is simply that (to the best of our knowledge) this is the first attempt to model the actual choice of procedures, even though the need to do so has been stressed often.⁴⁵ The empirical defenses, alluded to in section 2, stem from the fact that complex collective choice institutions often contain a variety of institutional devices and third parties whereby commitment is approximated. Again drawing from the House, these include precedents, standing rules, bill-specific rulemakers (the Rules Committee), and leaders (whips, majority and minority leaders, and the Speaker). Precedents and standing rules make it relatively difficult to change procedures in response to shortsighted whims of issue-specific majorities. In turn, this increases the probability that procedural promises (for example, regarding recognition or the assignment of rules) *can* be kept, provided that the promisors do not renege. Who, then, are the promisors, and why don't they renege? Typically, they are leaders and members of the Rules Committee. Attributes of these recipients of procedural powers include seniority (hence greater than average legislative experience and institutional knowledge), long-term time horizons (hence greater incentives to establish and maintain reputations for trustworthiness and institutional responsibility), and ideological moderation (hence greater inclinations to look after the interests of the parent chamber at-large rather than extreme factions thereof). All of these empirical regularities suggest that something akin to commitment via delegation exists in collective bodies that are "institutionalized" (Polshy). However, we acknowledge the need for further work in this area, including the possibility of altering the sequence of the game as well as continued empirical study of the mechanisms of delegation of procedural power. In the meantime, the qualified conclusion is that to the extent that collective choice institutions have delegation devices that permit some form of commitment to a procedural choice, the use of restrictive procedures in the presence of uncertainty is less puzzling than was previously thought.

quences, then frequent assignment of restrictive rules to the Ways and Means Committee, for example, may be interpreted as a procedural reward for having done "good work," that is, specializing for the benefit of the parent chamber. When such work ceased to exist—such as in the mid-1970s when the Committee became larger, more liberal, and more junior, and its chairman became somewhat unpredictable—the parent chamber's response was consistent with our informational rationale. The Committee's 42-year trend of receiving closed rules on tax legislation was broken. (See Morrison and Rudder for detailed accounts of the Ways and Means Committee throughout this period.)

45. Citations are of the informal variety: correspondence, conversations, comments at conferences, and referee reports.

8. SUMMARY

Restrictive amendment procedures often enhance the informational role of committees when the relationship between policies and their consequences is uncertain. The use of restrictive procedures results in policy outcomes that are more frequently mutually beneficial to the committee and parent chamber than those yielded via unrestrictive procedures. Restrictive procedures also increase the incentive for committees to specialize in policies within their jurisdictions. In uncertain environments with costly information and divergent preferences, restrictive procedures can yield benefits from specialization not attainable via unrestrictive procedures. In light of the rapid social, economic, and political change in the late nineteenth century and the associated uncertainty about new and often complex legislation, the development and use of restrictive amendment procedures in the U.S. House between 1870 and 1900 is consistent with the more general thesis of the paper. The informational rationale for restrictive procedures is that they enhance the informational role of committees.

APPENDIX

This appendix contains proofs for the propositions that are not obvious from the text.

Proposition 1. (a) For $\langle P^u | s = 0 \rangle$, the committee has no private information. This fact is public knowledge. Thus, $g^*(b) = \{\omega \in [0, 1]\}$, where $g^*(\cdot)$ is identical to the floor's prior beliefs about ω . The floor chooses the policy that maximizes $\int_0^1 -(p + \omega)^2 f(\omega) d\omega$, where $f(\omega)$ is the probability distribution function of ω , which, given the assumption that ω is distributed uniformly in $[0, 1]$, equals unity. This policy is $p^* = -\bar{\omega}$, where $\bar{\omega} = E(\omega)$. Since the committee's bill has no relevance here, it is not restricted in equilibrium and $b^* \in P$.

(b) Since $p^* = -\bar{\omega}$, outcomes outside the Pareto set, $[0, x_c]$, are yielded by $\omega < \bar{\omega}$ and $\omega > x_c + \bar{\omega}$. However outcomes are contained in $[0, x_c]$ for $\omega \in [\bar{\omega}, x_c + \bar{\omega}]$.

(c) $Eu_f = \int_0^1 -(-\bar{\omega} + \omega)^2 f(\omega) d\omega = -\sigma_\omega^2$ and $Eu_c = \int_0^1 -(\bar{\omega} + \omega - x_c)^2 f(\omega) d\omega = -\sigma_\omega^2 - x_c^2$.

Proposition 2. (a) It must be the case that (i) given $g^*(\cdot)$, $p^*(\cdot)$ maximizes Eu_f , (ii) given $p^*(\cdot)$, $b^*(\cdot)$ maximizes Eu_c , and (iii) the beliefs, $g^*(\cdot)$, are realized in equilibrium (consistent).

To show (i), suppose that for $b \in [x_c - a_{i+1}, x_c - a_i]$, the floor believes $\omega \in (a_i, a_{i+1}]$. If the floor believes $\omega \in (a_i, a_{i+1}]$, it chooses a policy that maximizes $\int_{a_i}^{a_{i+1}} -(p + \omega)^2 f(\omega) d\omega$. This policy is $p^*(b) = -(a_i + a_{i+1})/2$.

Condition (ii) requires that given $p^*(\cdot)$, $b^*(\cdot)$ maximizes Eu_c . This occurs

only if the committee is indifferent between inducing $p = -(a_i + a_{i+1}) / 2$ and $p = (a_{i-1} + a_i) / 2$ whenever $\omega = a_i$. If the committee has a strict preference for one of these policies when $\omega = a_i$, then for either $\omega = a_i + \epsilon$ or $\omega = a_i - \epsilon$, $b^*(\cdot)$ is not optimal for $\epsilon > 0$. Thus, it must be the case that

$$-\left[\frac{-(a_i + a_{i+1})}{2} + a_i - x_c \right]^2 = -\left[\frac{-(a_{i-1} + a_i)}{2} + a_i - x_c \right]^2,$$

which is true, given $a_{i-1} < a_i < a_{i+1}$, if and only if $a_{i+1} = 2a_i - a_{i-1} - 4x_c$. This second-order difference equation has a class of solutions parameterized by a_1 of the form $a_i = a_1 i + 2i(1 - i)x_c$, for $i = 0, \dots, N$ where N is the largest integer such that $|2N(1 - N)x_c| < 1$.

Condition (iii) requires that for consistency, $g^*(b) = \{\omega | b = b^*(\omega)\}$. That is, that the floor holds beliefs about ω that are consistent with the optimal behavior of the committee given ω . For $b \in [x_c - a_{i+1}, x_c - a_i]$, the floor believes $\omega \in (a_i, a_{i+1}]$. For $\omega \in (a_i, a_{i+1}]$, $b^*(\omega) \in [x_c - a_{i+1}, x_c - a_i]$. Thus, the floor's beliefs are consistent.

(b) Recall that $p^* = -(a_i + a_{i+1})/2$. Thus, the outcome is contained in $[0, x_c]$ if and only if $\omega \in [(a_i + a_{i+1})/2, x_c + (a_i + a_{i+1})/2]$.

(c) To calculate expected utilities, substitute the value of a_1 determined by $a_N = 1$, $[1 - 2N(1 - N)x_c]/N$, into the solution of the difference equation. This yields $a_i = \frac{1}{N} + 2i(N - i)x_c$, and $a_i - a_{i-1} = \frac{1}{N} + 2(N + 1 - 2i)x_c$. Then,

$$\begin{aligned} Eu_f &= \sum_{i=1}^N \int_{a_{i-1}}^{a_i} -\left[\omega - \frac{(a_i + a_{i-1})}{2} \right]^2 f(\omega) d\omega \\ &= -\sigma_\omega^2 \sum_{i=1}^N (a_i - a_{i-1})^3 \\ &= -\sigma_\omega^2 \sum_{i=1}^N \left[\frac{1}{N} + 2(N + 1 - 2i)x_c \right]^3 \\ &= -\frac{\sigma_\omega^2}{N^2} - \frac{x_c^2(N^2 - 1)}{3}. \end{aligned}$$

Similarly,

$$Eu_c = -\frac{\sigma_\omega^2}{N^2} - \frac{x_c^2(N^2 - 1)}{3} - x_c^2 - k.$$

Proposition 4. (a) Given $\langle P^r | s = 0 \rangle$, the floor adopts b if and only if it

expects to be better off under b than p_o . Thus, the committee will choose b to maximize $\int_0^1 - (b + \omega - x_c)^2 f(\omega) d\omega$ subject to the constraint $\int_0^1 - (b + \omega)^2 f(\omega) d\omega \geq \int_0^1 - (p_o - \omega)^2 f(\omega) d\omega$. For $p_o \leq -x_c - \bar{\omega}$ and $p_o \geq x_c - \bar{\omega}$, the floor prefers the committee's ideal point, $b^* = x_c - \bar{\omega}$, to the expected outcome under the status quo. For $p_o \in (-x_c - \bar{\omega}, -\bar{\omega})$, the committee can maximize its utility and still leave the floor indifferent between b and p_o by choosing $b^* = -p_o - 1$. For $p_o \in [-\bar{\omega}, x_c - \bar{\omega})$, the committee cannot make itself better off without decreasing the floor's expected utility. Since $s = 0$, $g^*(b) = \{\omega | \omega \in [0, 1]\}$.

(b) Whenever $p_o = -\bar{\omega}$, the committee cannot alter the status quo in the $\langle P^r | s = 0 \rangle$ game. Thus, $p^* = p_o$ and $x = p_o + \omega$. For $\omega < \bar{\omega}$, $x < 0$. For $\omega > x_c + \bar{\omega}$, $x > x_c$.

(c) For $p_o = -\bar{\omega}$, $b^*(p_o) = p_o = -\bar{\omega}$ and $Eu_f = -\sigma_\omega^2$, $Eu_c = -\sigma_\omega^2 - x_c^2$, the same as in $\langle P^u | s = 0 \rangle$.

Proposition 5. (a) It must be the case that (i) given $g^*(\cdot)$, $p^*(\cdot)$ maximizes Eu_f , (ii) given $p^*(\cdot)$, $b^*(\cdot)$ maximizes Eu_c , and (iii) the beliefs, $g^*(\cdot)$ are consistent.

To show (i) suppose that for all $b \in P$ such that $b \in [x_c - 1, p_o]$ or $b \in (4x_c + p_o, x_c]$, $g^*(b) = x_c - b$. Given these beliefs, it is optimal for the floor to accept the committee's bill since $-x_c^2 \geq (p_o + \omega)^2$ for all $\omega < -3x_c - p_o$ and $\omega \geq x_c - p_o$. Suppose that for $b = 4x_c + p_o$, $g^*(b) = \{\omega | \omega \in [-3x_c - p_o, -x_c - p_o]\}$. Given these beliefs, it remains optimal for the floor to accept the committee's bill since $\int_{-3x_c - p_o}^{-x_c - p_o} -(4x_c + p_o + \omega)^2 f(\omega) d\omega \geq \int_{-3x_c - p_o}^{-x_c - p_o} -(p_o + \omega)^2 f(\omega) d\omega$. And finally, suppose that for $b \in (p_o, 4x_c + p_o)$, $g^*(b) = \{\omega | \omega \in (-x_c - p_o, x_c - p_o)\}$. Given these beliefs, it is optimal for the floor to sustain p_o , since p_o maximizes $\int_{-x_c - p_o}^{x_c - p_o} -(p_o + \omega)^2 f(\omega) d\omega$. Thus, given $g^*(b)$, p^* is optimal.

Condition (ii) requires that given $p^*(\cdot)$, $b^*(\omega)$ must be optimal. Similar to proposition 2a, this occurs if and only if the committee is indifferent between inducing neighboring $p^*(\cdot)$ at relevant values of ω . This is true if the committee's utility at $\omega = -3x_c - p_o$, $\omega = -x_c - p_o$, and $\omega = x_c - p_o$ is equal given alternative neighboring policies. For $\omega = -3x_c - p_o$, $-(b + \omega - x_c)^2 = -(x_c - \omega + \omega - x_c)^2 = -(4x_c + p_o + \omega - x_c)^2 = 0$. For $\omega = -x_c - p_o$, $-(b + \omega - x_c)^2 = -(4x_c + p_o - x_c - p_o - x_c)^2 = -(p_o - x_c - p_o - x_c)^2 = -(p_o + \omega - x_c)^2 = -4x_c^2$. For $\omega = x_c - p_o$, $-(p_o + \omega - x_c)^2 = -(p_o + x_c - p_o - x_c)^2 = -(x_c - \omega + \omega - x_c)^2 = -(b + \omega - x_c)^2 = 0$. Thus, given $p^*(\cdot)$, $b^*(\omega)$ is optimal.

Condition (iii) requires that for consistency it must be the case that $g^*(b) = \{\omega | b = b^*(\omega)\}$. Substitution yields $\omega = g^*[b^*(\omega)]$.

(b) For $\omega \in [0, -3x_c - p_o]$ and $\omega \in [x_c - p_o, 1]$, $x = x_c$, which is contained in $[0, x_c]$. For $\omega \in (-p_o - x_c, x_c - p_o)$, $x = p_o + \omega$, which is contained in $[0, x_c]$ for $\omega \geq -p_o$.

(c) Since $x = x_c$ for $\omega \in [0, -3x_c - p_o]$ and $\omega \in [x_c - p_o, 1]$,

$$\begin{aligned} Eu_f &= \int_0^{-3x_c - p_o} -(x_c)^2 f(\omega) d\omega + \int_{-3x_c - p_o}^{-x_c - p_o} -(4x_c + p_o + \omega)^2 f(\omega) d\omega \\ &+ \int_{-x_c - p_o}^{x_c - p_o} -(p_o + \omega)^2 f(\omega) d\omega + \int_{x_c - p_o}^1 -(x_c)^2 f(\omega) d\omega \\ &= -\sigma_\omega^2 (4x_c)^3 - x_c^2. \end{aligned}$$

Similarly,

$$Eu_c = -\sigma_\omega^2 (4x_c)^3 - k.$$

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