Kosher Pork*

Allan Drazen† and Ethan Ilzetki‡

This Draft: July 18, 2010

Abstract

Both conventional wisdom and leading academic research view pork barrel spending as antithetical to responsible policymaking in times of crisis. In this paper we present an alternative view. When agents are heterogeneous in their ideology and in their information about the economic situation, allocation of pork may enable passage of legislation appropriate to a “crisis” that might otherwise not pass. Pork “greases the legislative wheels” not by bribing legislators to accept legislation they view as harmful, but by conveying information about the necessity of policy change, where it may be impossible to convey such information in the absence of pork. Pork may be used for this function in situations where all legislators would agree to forgo pork under full information. Moreover, when government has high pre-existing fiscal obligations (say from debt service) pork will be observed when the public good is most valuable precisely because it is valuable and the informed agenda setter wants to convey this information.

*We thank participants at the Stanford/UWI/CaPRI conference on Political Economy of Institutions, IIES Stockholm, the Spring 2010 NBER Political Economy Program Meeting, and the Princeton Conference in Dynamic Political Economy for many useful comments.

†University of Maryland, Collegio Carlo Alberto, NBER, and CEPR

‡London School of Economics and CEP
1 Introduction

Pork-barrel spending given to specific groups or districts at general expense is commonly seen as simply benefitting the recipients while hurting everyone else. The public associates pork with “politics as usual” as lawmakers satisfy their love of earmarks meant to benefit their constituents. This is to be distinguished from responsible policy making, in which legislators put their love of pork aside in times of “crisis” that is, when specific public goods have very high social value.

In a brilliant and justly influential paper Battaglini and Coate (2008) present a model formally capturing this difference in policy-making regimes. Depending on the social value of public goods and on the level of outstanding debt, which determines pre-existing claims on revenues, the economy may be in either of two regimes. In BAU (“business as usual”), the agenda setter distributes pork to members of the (minimum winning) coalition. In contrast, in RPM (“responsible policy making”), when the social value of public spending is high and/or debt is high, no pork is distributed to reflect the combination of high value of public good spending and low “discretionary” revenue.

RPM is not surprising if there is general agreement on the high social value of public goods, that is, general agreement on the existence and magnitude of a “crisis”, reflecting common information (though we argue below that such agreement is probably not the norm). Similarly, general agreement on public goods expenditure in a time of acknowledged crisis is possible when legislators are homogeneous in their preferences over spending. This is the assumption of Battaglini and Coate (2008): legislators are identical in their preferences, specifically having identical valuation of public goods expenditures in different states of nature; and they are equally informed and hence in agreement about the state of nature. Politics is entirely distributive, that is, determines who receives pork when there is (general) agreement on politics as usual. The known alternation of who has the spending power, combined with the possibility of adopting policy measures with less than unanimous legislative consent, leads to pork-barrel spending in non-crisis times, but no pork in crisis when spending on public goods is highly valued.1.

1The central role of “minimum winning coalitions” in this line of research is sometimes contrasted with “universalism” in the provision of pork (see, for example, Weingast [1979]). We follow much of the literature in assuming MWCs in a legislative equilibrium and not addressing the phenomenon of super-majority coalitions.
However, the assumption of identical legislators, though analytically convenient, is not realistic in many cases. Even considering a single economic policy, legislators differ in their beliefs about what the economic situation is, as well as in what they think is optimal policy in specific situations. Of course, this point is more general in economics, since the “representative agent” assumption is an approximation. For many questions, this assumption, though not strictly true, can be justified because the basic results are not changed by adding the complication of heterogeneity. Is that true in studying the political economy of pork barrel spending in legislative politics? That is, does the assumption of representative legislators – legislators who are identical in their policy preferences and information – matter qualitatively for studying the role of pork barrel spending in the legislative process?

The purpose of this paper is to address this question. Our principal conclusion is that it matters quite a bit.\footnote{Baron and Diermeier (2001) consider a model of legislative bargaining where heterogeneity of legislators’ preferences over policy plays a key role in explaining the composition and size of legislative coalitions (see the previous footnote). They assume agreement across legislators about the state of the world.} We argue that introducing heterogeneity of the sort discussed in the previous paragraph significantly changes the qualitative results of the Battaglini and Coate model using homogeneous legislators who agree on the value of public good spending versus pork. Our heterogeneous-agent results are complementary to the homogeneous-agent results of Battaglini and Coate, but as we shall see, dropping the standard representative-agent assumption makes a big difference.

More concretely, suppose the agenda setter believes there is a crisis and thinks special legislation is called for, but other lawmakers with different preferences and information, do not agree. Passage of the legislation the agenda setter favors may require deal-making, that is, the agenda setter giving other legislators something in exchange for their support. Usually this may be thought of as \textit{bribing} legislators to gain their support. However, differences in opinion about the current state suggest another, perhaps less obvious, sort of interaction to gain support. If the agenda setter has superior information about the state, she may use policy choice to try and \textit{inform} other legislators about the state. If she uses pork to do so, information transmission seems conceptually different from bribing other legislators where their beliefs about the state are unchanged.

The informational role of pork when legislators are heterogeneous leads to a refinement of the BAU and RPM regimes. In BAU pork may go to all legislators (“Complete BAU”)
or only some ("Partial BAU"); in the latter case, the desire of the agenda setter to signal the state may lead to her getting no pork, with all pork going to coalition partners. This contrasts with standard “divide-the-dollar” models of legislative bargaining, in which the agenda setter gets more pork than other coalition members.

More interestingly perhaps, we show that in situations of RPM under full information (such as large debt service obligations), asymmetric information will often lead to pork being given by the agenda setter to signal the state. Moreover, pork will be observed when the public good is most valuable, not when it is less valuable. That is, pork is not antithetical to “responsible policy making” but in fact crucial to policy being able to respond to a high valuation of the public good. Furthermore, this is not a pathological case but in fact appears to hold for parameter values describing actual economies.

In the paper, we concentrate on a positive analysis of pork – showing how pork may allow information transmission about the state of nature which would be impossible in the absence of pork – rather than on a normative analysis. We believe, however, that our results have significant normative implications as well. Pork implies a set of public goods policies which would not be politically feasible if pork were restricted. Some of these policies would imply higher social welfare than the no-pork status quo, but which policy emerges from the political process depends on the political mechanism; more specifically, it depends on the bargaining protocol between the agenda setter and other legislators in the winning coalition. We analyze a “closed amendment” process where the agenda setter makes “take-it-or-leave-it” offers. In this case, primarily because of the agenda-setter’s ability to extract all the bargaining surplus from other coalition members, pork appears to reduce social welfare generally. However, we also show that the feasible bargaining set includes policies where allowing allocation of pork increases social welfare, consistent with the agenda setter having less bargaining power and other coalition members having more. An “open amendment” process, allowing coalition members to make counterproposals in the political process – which would be a more realistic description of the legislative process – may allows these superior outcomes to be reached. Hence, our positive analysis may serve as the basis for an analysis of alternative legislative processes, more descriptive of how legislatures actually work, which would show how pork improves welfare under asymmetric information.

We also argue that in the absence of pork (or some primarily distributive policy), analogous information transmission may not be possible. This result provides a comparison – and
counterpoint – to Cukierman and Tommasi (1998a,1998b), in which the known ideological bias of the agenda setter, combined with asymmetric information, makes it impossible to adopt policy appropriate to the state of nature if it coincides with the agenda-setter’s bias. The addition of pork to the policy menu may make it possible to adopt such policy in this situation.

The plan of the paper is as follows. In the next section we consider the issue of asymmetrically-informed lawmakers from an empirical perspective. In section 3 we set out the basic model and the legislative process, as well as defining political equilibrium in the model. In section 4 we derive the political equilibrium under full information and characterize the various regimes. Section 5 presents the general characterization of an asymmetric information equilibrium and shows that when pork is restricted to be zero under asymmetric information there is no signaling of the state. In section 6, the conceptual heart of the paper, we demonstrate the informational role of pork both in BAU and in what would be RPM under full information. In section 7 we discuss some preliminary welfare implications of our results. Section 8 presents conclusions.

2 Asymmetrically Informed Legislators

Crucial to our argument about the signaling value of distributive policies is that lawmakers differ both in their information about the state of the world and in their ideology about what policy should be adopted in a given state of the world. More specifically, the agenda setter may use distributive policy to try to transmit information to other differentially informed lawmakers about the state of the world. (Note that for a positive analysis of the use of pork in the legislative process under asymmetric information, the agenda setter’s information need not be correct, but only different from that of other legislators. The possible improvement in welfare due to the signaling role of pork of course depends on the agenda setter having superior information.)

The leading example of agenda setters being better informed is the case of standing committee chairs, for example in the U.S. House and Senate. Committee chairs (and to a lesser degree members) exhibit a higher level of expertise on topics covered by their committee due to self-selection into the committee, and through experience serving on the committee. The drafter of legislation probably gains additional information about the state of the economy in
the process of drafting legislation. Moreover, committee chairs and other agenda setters are better informed about topics for which they propose legislation due to the increased intensity of lobbying by special interest groups (who themselves are well informed about the topics on which they lobby) towards these legislators.\footnote{See, for example, Ansolabehere, Snyder, and Tripathi (2002).}

The permanent committee system in the U.S. Senate means “the committees assumed the prerogative of determining which substantive provisions the Senate should consider, and they became policy-making bodies instead of merely technical aids to the chamber. Whereas the Senate formerly set the agenda, the committees came to be, in effect the Senate’s agenda-maker.”\footnote{http://www.senate.gov/artandhistory/history/common/briefing/Committees.htm} The same is true, perhaps even more so, in the U.S. House of Representatives, since House committee members specialize more than those in Senate. As Asher (1974) puts it, “congressmen accomplish their business largely by relying on the judgment of others. See also Shepsle (1988).

In short, the organization and effective operation of Congress via the committee system means that those in positions of agenda-setting power on an issue are better informed and relied upon on that issue.

Although conventional wisdom is that lawmakers may have similar information in times of extreme crisis when there is a “need for action”, we do not agree. Though there may be a common perception that there is a crisis which calls for a policy response, there will likely be disagreement among lawmakers about the causes, development, and magnitude of the crisis. Hence, in addition to any differences in preferred response due to ideological differences, lawmakers will likely disagree about the nature of the crisis and hence about the policy response. This was certainly the case for the 2008 financial crisis in the U.S. and the Bailout bill in September and October. This was true elsewhere as well. In Spain, for example, in 2008 there were heated debates between the incumbent PSOE party, led by Zapatero, and the opposition party PP, led by Rajoy, about the severity of the economic downturn.\footnote{We are indebted to Monica Martinez-Bravo for bringinging this to our attention. See for example, http://www.libertaddigital.com/economia/zapatero-se-burla-del-congreso-con-un-discurso-trunfalista-en-plena-crisis-1276334002/}
3 Model

3.1 Set-up

Consider a legislature consisting of $n$ districts, each with the following preferences over the consumption of private and public goods and leisure:

$$u (c^i, g) = c^i - \frac{h^{\frac{1}{\varepsilon}} + 1}{\varepsilon + 1} + (z + \alpha^i) v (g),$$  \hfill (1)

where $g$ and $c^i$ are the consumption of public and private goods, respectively and $h$ is the supply of labor. $z + \alpha^i$ is a parameter that affects the marginal value of the public good to households and includes a term $z$ that is identical across districts and another term $\alpha^i$ that is idiosyncratic to the specific district. $\alpha^i \in \{-\alpha, 0, \alpha\}$, with $\alpha > 0$, representing right-leaning, centrist and a left-leaning districts (where here “left” is defined as having a stronger preference towards the provision of public goods.) Let $n^L$ $n^C$ and $n^R$ represent the number of districts of each type, with $n^L + n^C + n^R = n$. The households maximize utility over the following budget constraint:

$$c^i = (1 - \tau) h + s^i,$$ \hfill (2)

where $\tau$ are labor taxes, the pre-tax wage is equal to unity, and $s^i$ are transfers from the central government (pork). The household’s first order conditions give

$$h (\tau) = [\varepsilon (1 - \tau)]^\varepsilon,$$ \hfill (3)

which reflects the fact that distortionary taxes affect the supply of labor. (Though $\varepsilon$ is literally the elasticity of labor supply, it primarily governs the extent to which taxes are distortionary, and could be interpreted more generally as the inefficiency inherent in the tax system.) Thus households’ indirect utility over taxes, and private and public consumption is:

$$U (s^i, \tau, g; \alpha^i) = \frac{\varepsilon^\varepsilon [(1 - \tau)]^{\varepsilon+1}}{\varepsilon + 1} + (z + \alpha^i) v (g) + s^i.$$

The first term is the sum of household’s utility from consumption net of $s^i$ (that is, $(1 - \tau) h$) and disutility of labor $h$. Note that this is only a function of $\tau$ and is identical across all individuals. Denoting this utility from leisure and the consumption financed by labor income
as \( \hat{u} (\tau) \equiv \frac{e^\tau (1-\tau)^{\tau+1}}{\tau+1} \), we may write indirect utility as

\[
U (s^i, \tau, g, \alpha^i, z) = \hat{u} (\tau) + (z + \alpha^i) v (g) + s^i
\]

(4)

### 3.2 Information structure

The values of \( \alpha^i \) are common knowledge, but only the agenda setter observes \( z \). She attempts to obtain the support of \( m - 1 \) other legislators, with \( m \) representing the size of the minimum winning coalition to pass a policy.\(^6\) Otherwise, a default policy is enacted. Let \( n^R < m \) and \( n^L < m \) so that no partisan legislator can pass legislation without the support of centrists. Other legislators do not observe \( z \) but have expectations based on a prior distribution \( z \in \{ \bar{z}, \hat{z} \} \) with probabilities \( \{1 - p, p\} \) respectively. Let \( z^e \equiv p\bar{z} + (1 - p)\hat{z} \) be the expected value of \( z \) prior to the legislative round. These information assumptions represent the potentially superior information of agenda setters on some issues discussed in section 2.

### 3.3 Political equilibrium

We consider the case with three legislators, with \( n^R = n^C = n^L = 1 \) and \( m = 2 \).\(^7\) Suppose that the agenda setter is “left-wing” in that \( \alpha^{A_S} = +\alpha \).\(^8\) It should be apparent that it is “cheapest” for her to build a coalition with the centrist \( (C) \) legislator. She proposes a policy \( \{g, \tau, s^C, s^\alpha\} \). A feasible policy satisfies

\[
g + s^C + s^\alpha \leq R (\tau) - X
\]

(5)

where \( X \) denotes prior obligations which must be met (for example, debt service) and \( R (\tau) \) is government revenue as a function of \( \tau \) defined by

\[
R (\tau) \equiv 3\tau e^\tau (1 - \tau)^\epsilon,
\]

---

\(^6\)For ease of exposition, the agenda setter will be female, the independent legislator male. The former assumption is often consistent with marital experience.

\(^7\)When there are more than three legislators, the basic arguments are the same, though the coalition will include both leftists and centrists.

\(^8\)We do not model how the agenda setter is chosen. She could be randomly chosen, with our analysis focusing on the information transmission problems when the agenda setter has a partisan bias.
from $h(\tau) = [\varepsilon (1 - \tau)]^6$.

If support is not obtained, a status quo policy of $g = g^q, s^C = s^C = 0$ is implemented (with $\tau^q$ given implicitly by $R(\tau^q) = g^q + X$). To summarize, the agenda setter wants to choose a feasible policy that maximizes $\hat{u}(\tau) + (z + \alpha) v(g) + s^C$ while ensuring the participation of the centrist, whose alternative is the status quo.

### 3.4 Status quo policy

The status quo policy thus affects the possibility of agreement and hence may influence the equilibrium even when agreement is reached. Though assuming a status quo that is highly “inappropriate” for a crisis may in fact be descriptive of the problem the agenda setter faces in convincing other legislators of the need for action, one may argue that arbitrary assumptions about $g^q$ and $\tau^q$ may bias our results. (In future research we plan to consider a dynamic model in which the natural assumption is that the status quo policy is that chosen in the previous period. The existence of pork in the status quo, which we rule out here, could have significant implications of the welfare effects of signaling the need for a change in policy via pork.) We therefore assume that status quo policy is that which would be chosen by a social planner who does not know the value of $z$. In other words, the status quo solves

$$\tau^q = \arg \max_{\tau} \{ \hat{u}(\tau) + z^e v \{ R(\tau) - X \} \} .$$

### 3.5 Preferred policy

It is also useful at this point to denote the most preferred policy of any legislator in the absence of pork, namely

$$\tau^*(\zeta, X) = \arg \max_{\tau} \{ \hat{u}(\tau) + \zeta v \{ R(\tau) - X \} \} , \quad (6)$$

---

9Battaglini and Coate (and much of the literature) assume an alternative bargaining protocol in which the failure of the agenda setter to gain support for her proposal implies another round of bargaining in which another legislator is randomly chosen to make an offer. However, the equilibrium in their paper would not change if they used the protocol we use here given their assumptions on legislator homogeneity.
where we note that $\tau^* (\zeta, X)$ is increasing in both $\zeta$ and $X$.\footnote{\(\tau^* (\zeta)\) solves the equation
\begin{equation}
\psi' (R(\tau^*(\zeta,X) - X)) \frac{1 - \tau^*(\zeta,X) - \varepsilon \tau^*(\zeta,X)}{1 - \tau^*(\zeta,X)} = \frac{1}{3\zeta}.
\end{equation}
\(\tau^*(\zeta,X)\) is increasing in $\zeta$ and in $X$.} This equation may be solved for

\begin{equation}
\mu (\tau^*(\zeta,X)) = \zeta v_y [R(\tau^*(\zeta)) - X]
\end{equation}

where $\mu (\tau^*(\zeta,X))$ is the marginal cost (per legislator) of raising a unit of tax revenues, defined as

\begin{equation}
\mu (\tau) \equiv \frac{\hat{u}_\tau (\tau)}{R_\tau (\tau)} = \frac{1 - \tau}{3(1 - \tau - \varepsilon \tau)}.
\end{equation}

With this notation in hand, the status quo is simply

\begin{equation}
\tau^q = \tau^*(z^e,X).
\end{equation}

For future exposition note that this implies that

\begin{equation}
\tau^* (\bar{z},X) > \tau^q > \tau^* (\bar{z},X)
\end{equation}

4 Full-Information Benchmark

As a benchmark and as an aid in understanding the possible informational role of pork, we begin with the case of full information. The nature of the equilibrium that obtains depends on the parameter values $\alpha$, $\bar{z}$, and $\bar{z}$. The assumption that the status quo policy is what a social planner would choose for the expected value of $z$, implying the bounds in (9), means that there are three cases to consider, namely

1) $\tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z}, X) > \tau^q > \tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z}, X)$

2) $\tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z}, X) > \tau^* (\bar{z} + \alpha, X) > \tau^q > \tau^* (\bar{z}, X)$

3) $\tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z}, X) > \tau^q > \tau^* (\bar{z}, X)$

In case 1 there is no conflict of interest on policy between the left-wing agenda setter and the centrist because the difference between $\bar{z}$ and $\bar{z}$ is large and dominates: when $z = \bar{z}$ both want taxes (and government expenditures) higher than in the status quo and when
both want taxes (and government expenditures) lower than in the status quo. Under asymmetric information, the direction of the tax change would reveal the state, and pork plays no interesting role.

Key to case II is that the difference between $\bar{z}$ and $\bar{z}$ is still large enough to dominate ideology. $\alpha < \bar{z} - \bar{z}$, so that the difference in preferred policy between the states exceeds the ideological difference between the agenda setter and the centrist. It may be possible to signal even without pork.

The interesting case is case III, which differs from case II in that here $\alpha > \bar{z} - \bar{z}$. That is, the ideological difference between the agenda setter and the centrist exceeds the difference in preferred policy between states (“ideology dominates policy”). It is interesting because pork may enable signaling the state, while only a pooling equilibrium is possible when no pork is available.\footnote{Case III is the Cukierman and Tommasi (1998) environment. There the ideological bias of (for example) a left-wing policymaker implied she wanted to change policy in her desired direction even if there was no change in the state of the world. She has no way of signaling that the changed state of the world calls for a leftward policy shift, so that she is unable to enact socially optimal policy. This is exactly the problem here where no pork is available.}

4.1 The agenda-setter’s optimization problem

Consider the problem of the agenda setter $\alpha$ in case III when the value of $z$ is common knowledge. For $z \in \{\bar{z}, \bar{z}\}$ the agenda setter proposes legislation that maximizes

\[
\max_{g, \tau, (s^1)} \hat{u}(\tau) + (z + \alpha) v(g) + s^\alpha
\]

\[
\hat{u}(\tau) + z v(g) + s^C \geq \hat{u}(\tau^q) + z v(g^q),
\]

\[
\hat{u}(\tau) + (z + \alpha) v(g) + s^\alpha \geq \hat{u}(\tau^q) + (z + \alpha) v(g^q),
\]

\[
g + s^C + s^\alpha \leq R(\tau) - X,
\]

\[
s^C \geq 0
\]

\[
s^\alpha \geq 0
\]

(11) is the participation constraint of the centrist, while (12) is the “participation constraint” of the agenda setter. It can be shown that under full information (12) is always slack and
(11) is always binding in equilibrium. (14) and (15) are the non-negativity constraints which will be useful in characterizing whether the equilibrium is BAU or RPM.

Then the first order conditions of this problem are given by:

\[
\begin{align*}
\left[ z \left( 1 + \phi^C \right) + \alpha \right] v_g (g) &= \lambda, \\
(1 + \phi^C) \mu (\tau) &= \lambda, \\
1 + \zeta^a &= \lambda, \\
\phi^C + \zeta^C &= \lambda,
\end{align*}
\]

where \( \lambda \) is the multiplier on (13); \( \phi^C \) on the participation constraint of the centrist; and \( \zeta^a \) and \( \zeta^C \) on the non-negativity constraints on pork for the agenda setter and the centrist, respectively.

### 4.2 Policy choice when \( z = \bar{z} \)

The parameter values such that case III obtains when \( z = \bar{z} \) (that is, \( \tau^* (\bar{z} + \alpha, X) > \tau^q > \tau^* (\bar{z}, X) \)) put limits on the ranking of marginal cost of taxation (equivalent for all legislators) and the marginal benefit of public goods in the status quo (which differs across legislators). More specifically the following ranking must hold:

\[
\bar{z} v_g (R (\tau^q) - X) < \mu (\tau^q) < (\bar{z} + \alpha) v_g (R (\tau^q) - X). \tag{20}
\]

It is crucial to note that these relative magnitudes are fixed in case III by assumptions on parameter values, the absolute magnitudes are not and will determine the nature of the equilibrium. The absolute magnitudes will also depend on \( X \) and \( \varepsilon \), which therefore determine the nature of the equilibrium. This full-information characteristic parallels Battaglini and Coate (2008) when \( X \) represents preexisting debt-service requirements which determine whether the economy is in BAU and RPM.

One critical absolute magnitude is \( 1 \), which is the marginal value of a unit of pork. When \( \bar{z} v_g (R (\tau^q) - X) > 1 \) then for the centrist (and hence for the left-wing agenda setter as well) the value of an additional unit of public goods in the status quo allocation exceeds that of an
additional unit of pork. The value of $\mu(\tau^q)$ relative to 1 determines the relative magnitudes of the marginal cost taxation and the marginal value of pork under the status quo policy.

The importance of the magnitudes in (20) relative to 1 is illustrated in Figure 1. Since the relative values of the marginal benefit of the public good to the centrist, of the marginal cost of taxation, and of the marginal benefit of the public good to the agenda setter in the status quo are fixed by the assumption that $\alpha > \bar{\alpha} - \bar{z}$, rather than sliding this ranking along the real number line, one can equivalently think of “sliding 1” over this ranking as represented in the diagram in the center.$^{12}$ (Ignore $\mu(\tau^q(\bar{z}))$ and $\mu(\tau^*(\bar{z} + \alpha))$ for now.)

Consider first the case where all magnitudes in (20) are greater than 1 (consistent with a high $X$):

$$1 < \bar{z} v_g(R(\tau^q) - X) < \mu(\tau^q) < (\bar{z} + \alpha) v_g(R(\tau^q) - X).$$

It should be clear that under this ranking, the only possible legislative outcome is the status quo $\tau^q$. While the agenda setter would like to increase taxes to finance the public good (the marginal value of the public good is higher to her than the marginal cost of taxation, which is higher than the marginal value of pork), the centrist places a lower value on either use of

$^{12}$An alternative interpretation of the number line at the top of Figure 1 is as representing decreasing values of $X$ as we move to the right. As all the values on the central axis increase (in absolute terms and thus relative to the value 1) as $X$ increases, lower values of $X$ would place 1 farther to the right along this number line. There is a mapping between values of $X$–decreasing along the axis–and the cutoff points between the regimes.
revenues to the marginal cost of taxation. Hence, no combination of public goods and pork can convince the centrist to agree to an increase in taxation. Thus, the equilibrium under (21) is RPM (no one gets pork), with \( \tau = \tau^q \). The same argument holds if

\[
\tilde{z}v_g (R (\tau^q) - X) < 1 < \mu (\tau^q) < (\tilde{z} + \alpha) v_g (R (\tau^q) - X).
\]

In contrast, consider the case in which

\[
\tilde{z}v_g (R (\tau^q) - X) < \mu (\tau^q) < 1 < (\tilde{z} + \alpha) v_g (R (\tau^q) - X). \tag{22}
\]

Under this ranking, the equilibrium will involve both a change in expenditures and taxation \textit{and} pork to the centrist. (Pork \textit{may} also be provided to the agenda setter.) While the agenda setter values a marginal increase in both the public good and pork more than the marginal cost of raising revenues, to the centrist only pork but not the public good has a higher marginal value than the cost of taxation. Hence, to gain the centrist’s agreement, the agenda setter must allocate some fraction of the revenues from higher taxes to pork given to the centrist. Specifically, suppose the agenda setter increased taxes above \( \tau^q \) to raise an additional unit of revenue and allocated a fraction \( \partial g \) to public goods and the remaining \( 1 - \partial g \) for pork to bribe the centrist. Then \( \partial g \) must satisfy

\[
\tilde{z}v_g (g^q) \partial g + 1 - \partial g \geq \mu (\tau^q)
\]

to gain the support of the centrist. As the agenda setter would like to give the minimal amount of pork required to obtain the centrist’s support (so the above holds with equality), the fraction of the marginal unit of revenue going to public goods consistent with the centrist’s participation constraint would be

\[
\partial g = \frac{1 - \mu (\tau^q)}{1 - \tilde{z}v_g (g^q)}.
\]

The bounds in (22) imply that \( 1 > \partial g > 0 \), so that political agreement is budget feasible.
This change in \( g \) would change the agenda-setter’s utility by

\[
\partial U = (\bar{z} + \alpha) v_g (g^q) \partial g - \mu (\tau^q)
\]

\[
= (\bar{z} + \alpha) v_g (g^q) \frac{1 - \mu (\tau^q)}{1 - \bar{z} v_g (g^q)} - \mu (\tau^q).
\]

The agenda setter’s utility would increase, that is, \( \partial U > 0 \), when

\[
\frac{(\bar{z} + \alpha) v_g (g^q)}{1 - \bar{z} v_g (g^q)} > \frac{\mu (\tau^q)}{1 - \mu (\tau^q)}.
\]

The left hand side of (23) is always larger than one. Hence, for \( \mu (\tau^q) \) sufficiently smaller than 1, the right-hand side will be less than the left-hand side of (23), so that the condition will hold. (One may see that this will clearly hold for \( \mu (\tau^q) < \frac{1}{2} \), while it cannot hold for \( \mu (\tau^q) \) approaching 1.) Hence, a BAU equilibrium will obtain, as illustrated by the leftmost vertical dotted line in the upper part of the diagram (i.e., for \( z = \bar{z} \)), where at least one coalition member gets pork.

The political equilibrium is given by the first order conditions (16) to (19) which imply that at the political equilibrium:

\[
\frac{(\bar{z} + \alpha) v_g (g^q)}{1 - \bar{z} v_g (g^q)} = \frac{\mu (\tau)}{1 - \mu (\tau)},
\]

which is (23) holding with equality.

A second critical value is \( \frac{1}{2} \), which is the value of a unit of pork if split equally between coalition members. It will determine whether one (Partial BAU) or both (Complete BAU) coalition members get pork in equilibrium. To see this, note that when

\[
\mu (\tau) = \frac{1}{2}
\]

then (24) reads

\[
(2\bar{z} + \alpha) v_g (g) = 1.
\]

These last two equations are precisely the first-order conditions (16) through (19) when \( \zeta^a = \zeta^c = 0 \), that is, they give taxation and government expenditure when both the agenda setter and the centrist obtain pork. (Both the marginal cost of taxation to the entire coalition
2\mu(\tau) and the collective cost of cutting public good expenditure by one unit to the entire coalition, namely \((2\bar{z} + \alpha)v_g(g)\), are set equal to the common marginal value of pork.

Conversely, when \(\mu(\tau^q) > \frac{1}{2}\), it must be the case that \(\mu(\tau) > \frac{1}{2}\) in equilibrium, and thus the agenda setter does not obtain pork in equilibrium. This follows from noting that the right hand side of (23) is decreasing in \(g\) while the left hand side is increasing in \(\tau\), so that the move from \(\{\tau^q, g^q\}\) to the political equilibrium involves increasing both \(\tau\) and \(g\). \(\tau > \tau^q\) implies \(\mu(\tau) > \mu(\tau^q) > \frac{1}{2}\).

In Figure 1 the Complete BAU case in which both coalition members get pork may be represented by \(\mu(\tau^q)\) being sufficiently less than 1, corresponding to the rightmost vertical dotted line in the upper part of the diagram (i.e., for \(z = \bar{z}\)). To the right of this line both coalition members get pork, to the left of it (but to the right of the leftmost vertical dotted line), only the centrist gets pork in a political equilibrium.

We conclude that there are three regions of the state space. These are:

- **RPM**: Neither legislator gets pork in equilibrium if \(\mu(\tau^q) > 1\) or if \(\mu(\tau^q) < 1\) and (23) does not hold. The equilibrium is the status quo, as the legislators cannot agree on an alternative \((\tau, g)\) policy (i.e., cutting taxes from their high status quo rates or increasing public expenditures from their low status quo levels).

- **“Partial” BAU**: Only the centrist gets pork to the centrist. This occurs if \(\mu(\tau^q) < 1\), (23) holds, and the non-negativity constraint on the agenda setter’s pork is binding in equilibrium.

- **“Complete” BAU**: Both legislators obtain pork and the equilibrium tax and public goods provision are as described in equations (25) and (26). This occurs if \((\bar{z} + \alpha)v_g(g^q) < 1\) and only if \(\mu(\tau^q) < \frac{1}{2}\).

### 4.3 Policy choice when \(z = \bar{z}\)

Now consider the case when \(z = \bar{z}\) and this is known to both legislators. Here, the parameter assumptions imply

\[\mu(\tau^q) < \bar{z}v_g(R(\tau^q) - X) < (\bar{z} + \alpha)v_g(R(\tau^q) - X).\]
The analysis is conceptually similar to the case of full information when \( z = \bar{z} \), as are the basic results about the existence of three regimes, though the analysis is more complicated. We summarize the main results in the text, concentrating on the differences from the case of \( z = \bar{z} \), and present a more detailed analysis in Appendix A.

Again, the location of 1 relative to the terms in this inequality will determine in part the regime that obtains; however, as shown in the lower half of Figure 1, the absolute magnitudes consistent with each regime are different. More specifically, the cut-off points are shifted to the right, so that (for example), there are values of \( \mu (\tau^q) \) that would imply Partial BAU when \( z = \bar{z} \) but imply RPM when \( z = \bar{z} \). Analogously, there are values of \( \mu (\tau^q) \) that would imply Complete BAU when \( z = \bar{z} \) but imply Partial BAU when \( z = \bar{z} \). Intuitively, the higher value of the public good implied by the higher known value of \( z \) means that pork will be “used less” for a given marginal cost of taxation. This corresponds to the results in Battaglini and Coate (2008).

A second key difference between the case where \( z = \bar{z} \) and that where \( z = \bar{z} \) is the equilibrium tax and expenditure policy. When it is known that \( z = \bar{z} \) both coalition members agree that government expenditures are too low and that taxes should be increased in order to finance them. They do not agree, however, on the magnitude of tax and expenditure increases. This disagreement creates a rich set of possible equilibria.

One possibility is an RPM equilibrium, where this time the equilibrium policy is

\[
\tau = \min \{ \bar{\tau}^q (\bar{z}), \tau^* (\bar{z} + \alpha) \},
\]

rather than the status quo. \( \bar{\tau}^q (\bar{z}) \) is a different policy, where no pork is allocated, that gives the centrist the same utility as \( \tau^q \). That is, \( \bar{\tau}^q (\bar{z}) \) is a solution to

\[
\hat{u} (\bar{\tau}^q (\bar{z})) + \bar{\varepsilon} v (R (\bar{\tau}^q (\bar{z}))) = \hat{u} (\tau^q) + \bar{\varepsilon} v (R (\tau^q)),
\]

such that \( \bar{\tau}^q (\bar{z}) \neq \tau^q \).\textsuperscript{13} The first possibility in (27) follows directly from the budget constraint (13) and the centrist’s participation constraint when \( s^C = s^\alpha = 0 \). The latter reflects

\textsuperscript{13} An analysis of the topology of the function \( \hat{u} (\tau) + \zeta v (R (\tau)) \) shows that the ideal point \( \tau^* (\zeta) \) is a unique local maximum (for each value of \( \zeta \)) and unique inflection point of the function. Utility is thus strictly increasing in \( \tau \) to the left and strictly decreasing in \( \tau \) to the right of this ideal point. So if \( \tau^q \) is smaller than \( \tau^* (\zeta) \) there must be a value of \( \tau \) that is larger than \( \tau^* (\zeta) \) that provides the same value.

16
the case when the participation constraint of the centrist is slack, so that \( \phi_C = 0 \) in the first order conditions. The first order conditions (16) and (17) then give

\[
(z + \alpha) v_g(g) = \mu(\tau),
\]

which combined with (13) when \( s_C = s^\alpha = 0 \) give precisely \( \tau = \tau^*(z + \alpha) > \tau^q \).

Intuitively, the agenda setter uses her agenda-setting power to propose her preferred policy (without pork) \( \tau^*(z + \alpha) \) unless this would not gain the agreement of the centrist, in which case the equilibrium policy is \( \tau^q(z) > \tau^q \) (implying a value of \( g > g^q \)) which leaves the centrist no worse off than the status quo. Intuitively, the agenda setter wants to raise \( \tau \) and \( g \) as close as she can to her preferred policy consistent with keeping the coalition together. This RPM policy is certainly the equilibrium if \( \mu\left(\min\{\tau^q(z), \tau^*(z + \alpha)\}\right) > 1 \), as once this no-pork equilibrium is attained, neither legislator would accept higher taxes in return for pork, and the agenda setter would not forgo public goods for pork.

If, on the other hand, \( \mu\left(\min\{\tau^q(z), \tau^*(z + \alpha)\}\right) < 1 \), the regime may be RPM, Partial BAU, or Complete BAU, depending on the relative values of \( \mu(\tau^q), \mu(\tau^*(z + \alpha)) \), and 1, as explained in Appendix A. This case raises a third difference from \( z = \bar{z} \): when \( z = \bar{z} \) the regime may be Partial BAU where it is the agenda setter who gets pork.

To illustrate this case, suppose that \( \tau^*(z + \alpha) > \bar{\tau}^q(z) \) and that \( \mu(\tau^*(z + \alpha)) < 1 \), so that the participation constraint of the centrist is slack at the agenda-setter’s ideal no-pork policy \( \tau^*(z + \alpha) \). Since the marginal cost of taxation at this policy is lower than the marginal value of pork, the agenda setter would extracting pork for her own district, until either the the participation constraint of the centrist is binding, or \( \mu(\tau) = 1 \). We thus have a Partial BAU equilibrium with the agenda setter, rather than the centrist, obtaining pork.\(^{14}\)

If instead, \( \tau^*(z + \alpha) > \bar{\tau}^q(z) \), but \( \mu(\bar{\tau}^q(z)) < 1 \), equilibrium may be Partial BAU with either the centrist or the agenda setter obtaining pork. The former may occur because the agenda setter finds it optimal to increase taxes beyond \( \bar{\tau}^q(z) \) and increase government expenditure as well. However, as \( \bar{\tau}^q(z) \) is the highest level of taxation that the centrist would

\(^{14}\)This is reminiscent of the Baron and Diermeyer (2001) result that the agenda setter can use a crisis (a very bad status quo policy) to extract some pork for herself. However, unlike their paper, no “grand-coalition” equilibrium exists, as we have assumed that ideology dominates policy \( (\alpha > \bar{z} - \bar{z}) \). So while the centrist and the agenda setter agree that public spending needs to increase at the expense of higher taxes, the right-wing legislator does not, and the agenda setter cannot extract rents from including the right-winger in the coalition.
accept without receiving pork, the centrist’s support is obtained through a combination of higher public good provision and pork. As we show in Appendix A, this equilibrium obtains only if

$$\frac{(z + \alpha) v_g (R(\bar{\tau}^q(\bar{z})) - X)}{1 - \bar{z} v_g (R(\bar{\tau}^q(\bar{z})) - X)} > \frac{\mu(\bar{\tau}^q(\bar{z}))}{1 - \mu(\bar{\tau}^q(\bar{z}))},$$

(30)

and will be Partial BAU with the centrist obtaining pork.

On the other hand, if $$(\bar{z} + \alpha) v_g (R(\bar{\tau}^q(\bar{z})) - X) < 1$$, the no-pork equilibrium at $$\bar{\tau}^q(\bar{z})$$ may not be optimal for a different reason. While the agenda setter would prefer a higher tax rate than $$\bar{\tau}^q(\bar{z})$$ in the absence of pork (as $$\bar{\tau}^q(\bar{z}) < \tau^*(\bar{z} + \alpha)$$), the agenda setter would prefer pork to government expenditure if enough of this pork is allocated to her own district. As shown in Appendix A, if

$$\left[ \frac{\bar{z}}{\mu(\bar{\tau}^q(\bar{z}))} + \alpha \right] v_g (R(\bar{\tau}^q(\bar{z})) - X) < 1,$$

(31)

the agenda setter will finance her district’s pork by allocating less than the no-pork equilibrium level of general public expenditures. She gains the centrist’s acceptance for this policy by setting the tax rate to a level lower than the no-pork equilibrium policy of $$\bar{\tau}^q(\bar{z})$$. This is possible because $$\mu(\bar{\tau}^q(\bar{z})) > \bar{z} v_g (R(\bar{\tau}^q(\bar{z})) - X)$$, implying that a tax cut and a commensurate cut in public expenditures leaves the centrist with surplus, that the agenda setter can exploit to extract rents.

Finally if the marginal cost of taxation $$\mu(\min \{\bar{\tau}^q(\bar{z}), \tau^*(\bar{z} + \alpha)\})$$ is sufficiently low, we will find ourselves in Complete BAU.

To summarize, when $$z = \bar{z}$$ there are also three regions of the state space, consistent with four regimes. These are:

- **RPM**: This obtains if $$\mu(\min \{\bar{\tau}^q(\bar{z}), \tau^*(\bar{z} + \alpha)\}) > 1$$ or if $$\bar{\tau}^q(\bar{z}) < \tau^*(\bar{z} + \alpha)$$ and neither (30) nor (31) hold.

- **"Partial" BAU (Centrist)**: Only the centrist obtains pork. This obtains only if $$\bar{\tau}^q(\bar{z}) < \tau^*(\bar{z} + \alpha)$$, $$\mu(\bar{\tau}^q(\bar{z})) < 1$$ and (30) holds.

- **"Partial" BAU (Agenda Setter)**: Only the agenda setter obtains pork. This obtains only if either (1) $$\tau^*(\bar{z} + \alpha) < \bar{\tau}^q(\bar{z})$$ and $$\mu(\tau^*(\bar{z} + \alpha)) < 1$$, or (2) $$\bar{\tau}^q(\bar{z}) < \tau^*(\bar{z} + \alpha)$$, $$\bar{\tau}^q(\bar{z}) < 1$$ and (31) holds.
“Complete” BAU: This obtains if \( \mu(\min\{\bar{r}^q(\bar{z}), \tau^* (\bar{z} + \alpha)\}) \) is sufficiently low.

These are illustrated in the lower half of Figure 1. We have seen that if \( \mu(\tau^a) > 1 \), the equilibrium policy is RPM. The cut-off points for Partial and Complete BAU are determined by values of \( \bar{r}^q(\bar{z}) \) and \( \tau^* (\bar{z} + \alpha) \) relative to 1 (and to each other). Figure 1 presents one possible configuration, where \( \bar{r}^q(\bar{z}) < \tau^* (\bar{z} + \alpha) \). As described in Appendix A, when \( \mu(\bar{r}^q(\bar{z})) < 1 \) the economy is in RPM, but even if \( \mu(\bar{r}^q(\bar{z})) \) is slightly larger than one, (30) cannot hold and the legislative outcome is RPM as well. The cut-off with Partial BAU is then strictly higher than \( \mu(\bar{r}^q(\bar{z})) \) as shown in Figure 1. In this Partial BAU, either the centrist or the agenda setter may pork. Another possibility (not shown) is that \( \bar{r}^q(\bar{z}) > \tau^* (\bar{z} + \alpha) \). There, the cutoff between RPM and Partial-BAU, would be exactly when \( \mu(\tau^* (\bar{z} + \alpha)) = 1 \). Finally, if 1 is sufficiently far to the right, we are in Complete BAU.

5 Asymmetric Information

We now begin our consideration of asymmetric information about the state \( z \). Our equilibrium concept is Perfect Bayesian Equilibrium. We concentrate on the case of the +\( \alpha \) agenda setter.

5.1 Characterization of Equilibrium

**Definition 1** A perfect Bayesian equilibrium (PBE) of the described game is defined as follows:

1. Given coalition members’ beliefs on the state \( z \), which we denote \( \bar{z} \), the agenda setter (in each state \( z = \bar{z} \) and \( z = \bar{z} \)) offers a proposal that satisfies the following:

\[
\max_{g,\tau,s} \hat{u}(\tau) + (z + \alpha) v(g) + s^\alpha
\]

subject to the constraints (11), (12), (13), (14), and (15) In other words, the proposal maximizes the agenda setter’s utility subject to the participation of the coalition member and the non-negativity constraints.

2. Beliefs \( \bar{z} \) are consistent with the strategies of the agenda setter when \( z = \bar{z} \) and \( z = \bar{z} \). In other words, if the proposals offered by the agenda setter in the two states, following from
part 1 of this definition, are identical, then \( \tilde{z} = z^c \equiv (1 - p)\tilde{z} + p\tilde{z} \). If the proposals are different then \( \tilde{z} = \bar{z} \) when the \( z = \bar{z} \) agenda setter’s optimal legislation is proposed and \( \tilde{z} = \bar{z} \) when the \( z = \bar{z} \) agenda setter’s optimal legislation is proposed.

As usual, the definition of the PBE does not restrict beliefs on \( z \) off the equilibrium path, and equilibrium refinements will be necessary to restrict the large number of PBE that emerge from this definition. We will use the Cho-Kreps (1987) intuitive criterion to rule out “unreasonable” off-the-equilibrium-path beliefs.

All variables other than \( \psi \) have been defined in the first-order conditions for the full information case. \( \psi \) is the multiplier on the constraint (41) that the agenda setter in state \( \tilde{z} \) finds it optimal not to mimic the agenda setter in state \( \bar{z} \). \( \psi = 0 \) identically when the state is \( z = \bar{z} \).

There are two types of candidate equilibria of this model:

- **Pooling:** the agenda setter proposes the same legislation \( \forall z \in \{ \tilde{z}, \bar{z} \} \). Coalition members’ beliefs (other than those of the agenda setter) are \( \tilde{z} = (1 - p)\bar{z} + p\tilde{z} \) when observing this legislation.

- **Separating:** it is always the \( z = \tilde{z} \) agenda setter who would like to mimic the \( z = \bar{z} \) agenda setter, and not vice versa. Thus in a separating equilibrium, the \( z = \tilde{z} \) equilibrium will be identical to the full information equilibrium analyzed above. The \( z = \bar{z} \) node of the separating equilibrium is characterized by a policy that maximizes the agenda setter’s utility, subject to the participation of the centrist and separation from the \( z = \tilde{z} \) node. Coalition members’ beliefs include \( \tilde{z} = z \) when the optimal proposals of the \( z = \tilde{z} \) and the \( z = \bar{z} \) agenda setters are observed.

We will show that a separating (i.e., “information-revealing”) exists almost always and when it exists it is the unique equilibrium that satisfies the Cho-Kreps intuitive criterion. The exception is a small part of the state-space with high values of \( X \), which exists only for certain values of other parameters (\( \tilde{z}, \bar{z} \) and \( \alpha \)). In this latter region the sole equilibrium is pooling at the status quo. This contrasts significantly with the equilibrium that would obtain if no pork were allowed: with no pork, pooling at the status quo is everywhere the only equilibrium.
When equilibrium is separating, then when \( z = \tilde{z} \) the agenda setter realizes she cannot benefit from mimicking the \( z = \tilde{z} \) proposal, and proposes the same policy she would propose with full information when \( z = \tilde{z} \). When \( z = \tilde{z} \), the agenda proposes a policy that maximizes her utility, subject to the participation of the centrist, and subject to informing that \( z = \tilde{z} \). The maximization problem then yields the following first order conditions in each state \( z = \tilde{z} \) and \( z = \tilde{z} \) that solve for the nine variables \( \{g, \tau, s^\alpha, s^C, \lambda, \phi^C, \zeta^C, \zeta^\alpha, \psi\} \):

\[
\begin{align*}
[z (1 + \phi^C) + \alpha (1 - \psi) - \tilde{z} \psi] v_g (g) &= \lambda, \quad (33) \\
(1 + \phi^C - \psi) \mu (\tau) &= \lambda, \quad (34) \\
1 + \zeta^\alpha - \psi &= \lambda, \quad (35) \\
\phi^C + \zeta^C &= \lambda, \quad (36) \\
\{\hat{u} (\tau) + zv (g) + s^C - [\hat{u} (\tau^q) + zv (g^q)]\} \phi^C &= 0, \quad (37) \\
R (\tau) - [X + g + s^C + s^\alpha] &\geq 0, \quad (38) \\
\zeta^C s^C &= 0 \quad (39) \\
\zeta^\alpha s^\alpha &= 0 \quad (40) \\
\{\hat{u} (\tau) + (\tilde{z} + \alpha) v (g) + s^\alpha - U^\alpha \} \psi &= 0 \quad (41)
\end{align*}
\]

Candidate pooling equilibria, on the other hand, solve a maximization problem identical to the full information problem defined by (10) to (15), with the exception that (11) is replaced with

\[
\hat{u} (\tau) + z^c v (g) + s^C \geq \hat{u} (\tau^q) + z^c v (g^q), \quad (42)
\]

### 5.2 Restricting Pork

As a benchmark, we begin with the case in which pork barrel spending is restricted by law. Trying to restrict pork is often seen as a socially beneficial reform.\(^{15}\) When pork is

\(^{15}\)In the U.S., restricting pork is often associated with Sen. John McCain (see, for example, *Washington Post* [2006]), though it has made little headway (*Washington Post* [2009]).
unavailable, the agenda setter proposes legislation that maximizes her own utility

$$\max_{g, \tau} \hat{u} (\tau) + (z + \alpha) v (g),$$

subject to a feasibility constraint

$$g = R (\tau) - X$$

and subject to legislator C’s participation constraint

$$\hat{u} (\tau) + \tilde{z} v (g) \geq \hat{u} (\tau^q) + \tilde{z} v (g^q)$$

(43)

and possibly to other constraints as we outline below.

A perfect Bayesian equilibrium of this game is defined in section 5.1, but where transfers s are restricted to be zero.

In a separating equilibrium, the \( z = \bar{z} \) agenda setter proposes a policy that maximizes her utility subject to the budget constraint, C’s participation constraint (43), and her own participation constraint (12) evaluated at \( z = \bar{z} \) when the \( s^i \) are set to zero. Our assumption that \( \tau^q \) is the social optimum for \( z^e \) implies \( \tau^* (\bar{z} + \alpha) > \tau^q > \tau^* (\bar{z}) \). The equilibrium policy is then obviously \( \tau' = \tau^q \).

Now consider the problem facing the \( z = \bar{z} \) agenda setter. Of the three cases set out at the beginning of section 5.6, case III was the interesting one in which \( \tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z} + \alpha, X) > \tau^* (\bar{z}, X) > \tau^q > \tau^* (\bar{z}, X) \). In this case the \( \bar{z} \) cannot signal the state and only a pooling equilibrium exists at \( \tau' = \tau^q \). Any \( \tau \) above \( \tau^q \) acceptable to the centrist would be favored by both the \( \bar{z} \) and the \( z \) agenda setter and hence could not signal the state. The centrist would therefore prefer \( \tau^q \). The \( \bar{z} \) agenda setter would not find it optimal to propose any \( \tau < \tau^q \), so that \( \tau^q \) is the only political equilibrium. With both types of agenda setter proposing \( \tau^q \), a pooling equilibrium obtains. Hence, when pork is restricted to be 0, information about the state cannot be conveyed.

6 Pork As A Signal

We now turn to our main question: under asymmetric information about the state \( z \), possible use of pork – in addition to \( g \) and \( \tau \) – in order to signal \( z \). Note that the agenda setter cannot
signal by “burning pork” without an associated change in $g$ or $\tau$, since burning pork alone does not hurt the $z = \bar{z}$ agenda setter differentially from the $z = \bar{z}$ agenda setter. In other words, there is no marginal change in $s^\alpha$ and $s^C$ alone that the $z = \bar{z}$ agenda setter would tolerate, but the $z = \bar{z}$ agenda setter would not. However, the existence of pork allows the agenda setter to signal the state through changes in a combination of pork and policy. These changes would not be possible if pork were unavailable; in this way pork allows the transmission of information.

We consider the case where information cannot be transmitted if pork is restricted to be zero, that is, Case III, reflecting $\alpha > \bar{z} - \bar{z}$. The following ranking of costs and benefits of fiscal policy must hold:

$$zv_g (R (\tau^q) - X) < \mu (\tau^q) < \bar{z}v_g (R (\tau^q) - X) < (z + \alpha) v_g (R (\tau^q) - X) < (\bar{z} + \alpha) v_g (R (\tau^q) - X).$$

A summary of the regimes is in Figure 2. As in Figure 1, the central axis gives the ranking of $\zeta v_g (g)$ for different values $\zeta \in \{z, \bar{z}, z + \alpha, \bar{z} + \alpha\}$ and $\mu (\tau)$. The top and bottom panels give the location of the value 1 relative to these terms for $z = z$ and $z = \bar{z}$, respectively. Dotted lines indicate the cutoffs between regimes. Except for the region marked as “RPM”, across the entire state space, the equilibrium is a separating equilibrium – identical to full information when $z = \bar{z}$, but sometimes different when $z = z$.
The differences are can be seen in the bottom panel, where we have retained the borders between full-information regimes in light-shaded lines. When \( z = \bar{z} \), with full information the equilibrium is RPM everywhere to the left of the leftmost shaded line. With asymmetric information, a large part of this region is Partial BAU. This is true even in parts of the region were the economy is in RPM when \( z = \bar{z} \). Moreover, there are parameter values for which RPM does not hold anywhere in the state space.

It is interesting to note that in the entire region labeled “Partial BAU” and parts of the region labeled “Partial/Complete BAU”, the agenda setter is providing more pork to the centrist when \( z = \bar{z} \) than when \( z = \bar{z} \), in order to signal that \( z = \bar{z} \). Thus in large parts of the state space, including the entire region marked as "Partial BAU", the agenda setter is providing no less pork when \( z = \bar{z} \) than when \( z = \bar{z} \). We now consider the regimes in greater detail

### 6.1 Complete BAU under asymmetric information

Consider first the case of Complete BAU. As illustrated in Figure 2, a sufficient but not necessary condition to be in Complete BAU is that \( (\bar{z} + \alpha) v_g (R(\tau^q) - X) < 1 \) (and hence all other magnitudes in (44) are also less that 1), so that the non-negativity constraint on pork to be slack for both coalition members. The case of Complete BAU will be useful primarily in illustrating the signaling role of pork under asymmetric information.

In a separating equilibrium when \( z = \bar{z} \) the agenda setter proposes legislation that maximizes (32), subject to the constraints (11), (12), (13), (14), and (15) with \( \bar{z} = z = \bar{z} \). Hence the policy proposal is the same as under full information policy: \( \mu (\tau) = \frac{1}{2} \) (25 above) and \( (2\bar{z} + \alpha) v_g (g) = 1 \) (26 above). We denote these as \( \tau^{BAU} \) (which will be the same for \( z = \bar{z} \)) and \( g_{\bar{z}} \). Since the non-negativity constraint on pork is not binding, the participation constraint (11) can be substituted into the feasibility constraint (5) which can then be rewritten as:

\[
s^\alpha \leq s^\alpha_{\text{Part}} (\bar{z}) \equiv R (\tau^{BAU}) - X - g_{\bar{z}} + \left[ (\hat{u} (\tau^{BAU}) + \bar{z} v (g_{\bar{z}})) - (\hat{u} (\tau^q) + \bar{z} v (g^q)) \right]. \quad (45)
\]
The policy vector \((g_z, \tau^{BAU}, s^\alpha_z)\) gives the agenda setter the following utility:

\[
U^\alpha_z = \hat{u} (\tau^{BAU}) + (\bar{z} + \alpha) v (g_z) + R (\tau^{BAU}) - X - g_z - \left[ (\hat{u} (\tau^q) - \hat{u} (\tau^{BAU})) + \bar{z} (v (g^q) - v (g_z)) \right]
\]

(46)

When \(z = \bar{z}\) the agenda setter performs the same maximization, but with the additional restriction that the \(z = \bar{z}\) agenda setter does not want to mimic this strategy:

\[
\hat{u} (\tau^{BAU}) + (\bar{z} + \alpha) v (g_z) + s^\alpha \leq U^\alpha_{\bar{z}}.
\]

(47)

Using (46) this may be written

\[
s^\alpha \leq s^\alpha_{z, \text{sep}} \equiv (\bar{z} + \alpha) v (g_z) - (\bar{z} + \alpha) v (g_z) + R (\tau^{BAU}) - X - g_z
\]

\[
- \left[ (\hat{u} (\tau^q) - \hat{u} (\tau^{BAU})) + \bar{z} (v (g^q) - v (g_z)) \right],
\]

(48)

where \(s^\alpha_{z, \text{sep}}\) denotes the maximum pork that the type-\(z\) agenda setter can retain consistent with separating herself from the type-\(z\) agenda setter. The participation constraint of the centrist when \(z = \bar{z}\) may be written

\[
s^\alpha \leq s^\alpha_{\text{Part}} (\bar{z}) \equiv \left[ R (\tau^{BAU}) - X - g_z \right] - \left[ (\hat{u} (\tau^q) - \hat{u} (\tau^{BAU})) + \bar{z} (v (g^q) - v (g_z)) \right]
\]

(49)

The Cho-Kreps criterion implies that at least one of these two equations must be binding in equilibrium. An examination of the above first-order conditions for the agenda-setter’s maximization problem shows that (49) must always be binding. (48), on the other hand, may or may not be binding in equilibrium.

If (48) is not binding, the full information equilibrium with \(z = \bar{z}\) is sufficient to signal that \(z = \bar{z}\). We refer to this as a “self-separating” equilibrium. The agenda setter obtains pork of

\[
s^\alpha_{z, \text{self}} = R (\tau^{BAU}) - X + \hat{u} (\tau^{BAU}) - \hat{u} (\tau^q)
\]

\[
+ \bar{z} [v (g_z) - v (g^q)] - g_z,
\]

determined by (49) and the following associated utility:

\[
U^\alpha_{\bar{z}, \text{self}} = \hat{u} (\tau^{BAU}) + (2 \bar{z} + \alpha) v (g_z) + R (\tau^{BAU}) - X - g_z + 2 \hat{u} (\tau^{BAU}) - \hat{u} (\tau^q)
\]

\[
+ \left[ (\hat{u} (\tau^{BAU}) - \hat{u} (\tau^q)) + \bar{z} (v (g_z) - v (g^q)) \right].
\]

(50)
The self-separating equilibrium exists if (48) holds with strict inequality:

\[
\left[ \hat{u} (\tau^{BAU}) - \hat{u} (\tau^q) \right] + (\hat{z} + \alpha) [v (g_z) - v (g^q)] + s^\alpha_{z,sefl} < U^\alpha_{\hat{z}}
\]

or

\[
(\hat{z} + \bar{z} + \alpha) [v (g_z) - v (q)] - g_z < (2\bar{z} + \alpha) [v (g_{\bar{z}}) - v (g^q)] - g_{\bar{z}}.
\]

This confirms that the \( z = \bar{z} \) agenda setter does not mimic the strategy of the \( z = \hat{z} \) agenda setter, since the condition (47) that must be satisfied can be simplified to

\[
(2\bar{z} + \alpha) [v (g_z) - v (g^q)] - g_z \geq (\bar{z} + \hat{z} + \alpha) [v (g_{\bar{z}}) - v (g^q)] - g_{\bar{z}}.
\]

Alternatively, both (49) and (48) are binding. Equilibrium is characterized by more public goods and less pork to the agenda setter than would be the case in the “self-separating” equilibrium, where (49) is binding but (48) is slack. The agenda setter then needs to alter her proposal to signal the state. She finances increases in the public good in part with cuts in pork sufficiently large that she would not accept them if \( z = \bar{z} \) (when the relative value of the public good is lower in terms of pork.) The remainder of the higher level of the public good is financed through cuts in pork to the centrist, who upon learning \( z = \bar{z} \) is willing to contribute as well. In equilibrium, \( \tau = \tau^{BAU} \) and \( g_{\bar{z}}, s^C \) and \( s^\alpha \) are given jointly by (48), (49) and (13).

The main candidate for a pooling equilibrium is one where the agenda setter in state \( z = \bar{z} \) proposes the policy that maximizes (32) subject to (5) with \( \bar{z} = \bar{z}' (= p\bar{z} + (1 - p) \hat{z}) \), which is mimicked by the \( z = \hat{z} \) agenda setter. One may rule out pooling equilibrium however by the Cho-Kreps criterion, since one can always find a profitable deviation for the agenda setter when \( z = \bar{z} \) that would not be mimicked when \( z = \hat{z} \). A formal demonstration is given in Appendix B.

### 6.2 Partial BAU under asymmetric information

When equilibrium is Partial BAU when \( z = \bar{z} \) under complete information, equilibrium is characterized by Partial BAU in asymmetric information as well. The unique separating equilibrium is one in which legislation is Partial BAU, regardless of \( z \) and where more pork
is provided in $z = \bar{z}$. To see why, note that in a separating equilibrium the $z = \bar{z}$ agenda setter would provide a mix of pork and increases in public expenditures to bring the centrist on board with higher taxes as in the complete information case of section 4.2. The $z = \bar{z}$ agenda setter cannot separate via policy alone since the $z = \bar{z}$ agenda setter would gladly mimic any proposal that did not involve additional pork to the centrist. Hence, the information constraint is binding and the $z = \bar{z}$ agenda setter is providing the centrist with more pork than is the $z = \bar{z}$ agenda setter does. Such an equilibrium exists since starting at the $z = \bar{z}$ equilibrium, any (unit) increase in tax revenues will be unacceptable to the $z = \bar{z}$ agenda setter if less than

$$\partial g = \frac{\mu(\tau)}{(\bar{z} + \alpha) v_{g}(g)}$$

of the revenues are allocated to public good provision, but this would be profitable for the $z = \bar{z}$ agenda setter and acceptable to the centrist if

$$\frac{\bar{z} v_{g}(g) - 1}{(\bar{z} + \alpha) v_{g}(g)} \geq \frac{\mu(\tau) - 1}{\mu(\tau)}. \quad (52)$$

which must always hold. Equilibrium is given by (52) with equality. Pooling equilibrium may be ruled out using the intuitive criterion.

Partial BAU may also occur elsewhere, for example in the region marked as “Partial/Complete BAU” in Figure 2. We have shown in the previous section how a Complete BAU separating equilibrium may exist. However, signalling in the previous section involves decreasing the pork allocated to both the centrist and the agenda setter. If the amount of pork allocated in complete BAU in $z = \bar{z}$ is sufficiently small (regions far enough to the left within Complete BAU in the upper panel of Figure 2), there may not be enough pork to signal by cutting the agenda setter’s pork alone. We show now that nevertheless a separating equilibrium exists, with Complete BAU when $z = \bar{z}$ and Partial BAU when $z = \bar{z}$, the case in which the full information equilibrium would be Complete BAU when $z = \bar{z}$ but Partial BAU when $z = \bar{z}$.

In this separating equilibrium, when $z = \bar{z}$ the agenda setter plays Complete BAU where

$$2\mu(\tau^{BAU}) = (2\bar{z} + \alpha) v_{g}(g_{\bar{z}}) = 1, \quad (53)$$

and when $z = \bar{z}$ let the agenda setter deviate along the complete BAU path described in
the previous section. The path is along the separation constraint. If the complete BAU equilibrium is infeasible, this is because \( s^\alpha = 0 \) is binding before the equilibrium is attained. At this point, the participation constraint of the centrist is slack, so that a partial BAU equilibrium is feasible if and only if further separation is possible. Let \( \{ g, \tau^{BAU} \} \) denote the policy at this point, recalling that in a complete BAU equilibrium, \( \tau = \tau^{BAU} \).

Separation requires that the \( z = \bar{z} \) increase taxes to finance a combination of public goods and pork to the centrist such that

\[
(z + \alpha) v_g(g) \partial g \leq \frac{1}{2} = \mu(\tau).
\]

with the remaining \( 1 - \partial g \) units of revenue allocated for pork to the centrist. The agenda setter wants to maximize \( \partial g \), so that expenditures are increased along the path

\[
\partial g = \frac{1}{2(z + \alpha) v_g(g)},
\]

which is profitable to the agenda setter when \( z = \bar{z} \) because

\[
(z + \alpha) v_g(g) \partial g = \frac{(\bar{z} + \alpha) v_g(g)}{2(z + \alpha) v_g(g)} > \mu(\tau^{BAU}) = \frac{1}{2}
\]

6.3 RPM under asymmetric information

Finally, we consider the case in which the regime would be RPM under complete information, regardless of the value of \( z \). (The case in which the economy under complete information would be in RPM if \( z = \bar{z} \) but in Partial BAU if \( z = \bar{z} \) was the first subcase presented in the previous subsection). A sufficient (but not necessary) condition for this to be the case is

\[
\bar{z} v_g(\bar{R}(\tau^q) - X) > 1 \quad \text{(and hence all other magnitudes in (44) are also greater than 1).}
\]

That is, we have

\[
1 < \bar{z} v_g(\bar{R}(\tau^q) - X) < \mu(\tau^q) < \bar{z} v_g(\bar{R}(\tau^q) - X) < (z + \alpha) v_g(\bar{R}(\tau^q) - X) < (\bar{z} + \alpha) v_g(\bar{R}(\tau^q) - X).
\]

This ranking could result from a high level of pre-existing fiscal obligations, reflecting for example, a high level of existing debt. High \( X \) would mean high taxes \( \tau \) but low \( g \), hence, high values of \( \mu(\tau^q) \) and \( v_g(\bar{R}(\tau^q) - X) \). Conceptually, this would be the exact analogue of
RPM in Battaglini and Coate (2008) where legislators are homogeneous in their valuation of the public good – a high value of the public good, perhaps due to high debt, implies that no pork is distributed.

A key result is that though no pork is given under full information, it may be given under asymmetric information. Moreover, it will be given when the state (observed by the agenda setter but not the centrist) is \( z \) rather than when it is \( \bar{z} \)! That is, under conditions of high \( X \) (that is, high debt) pork will be observed when the public good is most valuable, that is, in state \( \bar{z} \). It is used in a “crisis” rather than in better states of the world. In fact, for any parameter values \((\bar{z}, z, \alpha, \text{etc.})\) there must be a region of the state space (values of \( X \)) for which the regime would be RPM in both states of \( z \) under complete information, but would be Partial BAU if \( z = \bar{z} \) in asymmetric information.

This is in contrast with what would be true under full information with homogeneous policymakers (for example, in Battaglini and Coate’s (2008) two-state example), where at a given level of debt there may be pork in equilibrium for low but not high value of the public good, but not vice versa. Under asymmetric information pork may be used when the public good is most valuable in order to signal its high value to less informed legislators. Hence, pork is used precisely because the public good is valuable and the informed agenda setter wants to convey this information. That is, pork is not antithetical to “responsible policy making” but in fact crucial to policy being able to respond to a high valuation of the public good. And, pork is given to the centrist under asymmetric information even though he gets higher direct utility from public goods.

### 6.3.1 Derivation of equilibrium

To see that equilibrium may involve pork, let’s conjecture a separating equilibrium that satisfies the Cho-Kreps intuitive criterion. In a separating equilibrium, the \( z = \bar{z} \) agenda proposes the status quo. The \( z = \bar{z} \) agenda setter can propose a deviation from the status quo that is profitable to her, but would not be desirable for the agenda setter when \( z = \bar{z} \). Specifically, let the agenda setter raise one unit of tax revenues. If less than

\[
\partial g \leq \frac{\mu (\tau^q)}{(\bar{z} + \alpha) v_g (R (\tau^q) - X)} < 1
\]  

(55)
units of these revenues are allocated to the public good, this signals that \( z = \bar{z} \), as the \( z = \bar{z} \) agenda setter would be unwilling to bear the cost of taxation with so little of the proceeds allocated to public goods. On the other hand, for the \( z = \bar{z} \) agenda setter, this deviation is profitable as

\[
\frac{\mu (\tau^q) (\bar{z} + \alpha) v_g (R (\tau^q) - X)}{(\bar{z} + \alpha) v_g (R (\tau^q) - X)} > \mu (\tau^q).
\]

The participation constraint of the centrist (with the value of \( z \) now revealed) can be satisfied if:

\[
\tilde{z} v_g (R (\tau^q) - X) \partial g + 1 - \partial g \geq \mu (\tau^q),
\]

which may be rewritten as

\[
(\tilde{z} v_g (g^q) - 1) \partial g + 1 \geq \mu (\tau^q).
\]

(55) gives an upper bound on \( \partial g \) for information to be conveyed. (56) gives a lower bound on \( \partial g \) for the participation of the centrist. The centrist would like a higher level of \( g \) rather than more pork. As the agenda setter obviously wants to give as little pork as possible consistent with the participation of the centrist and signaling that \( z = \bar{z} \), it is clear that if both these equations are satisfied, (55) is the binding constraint. So

\[
\partial g = \frac{\mu (\tau^q)}{(\bar{z} + \alpha) v_g (R (\tau^q) - X)}
\]

and (55) becomes:

\[
(\tilde{z} v_g (R (\tau^q) - X) - 1) \frac{\mu (\tau^q)}{(\bar{z} + \alpha) v_g (R (\tau^q) - X)} + 1 > \mu (\tau^q).
\]

Rearranging terms, one sees that pork will be used to signal whenever

\[
(\bar{z} + \alpha) v_g (R (\tau^q) - X) > (1 + [\alpha - (\bar{z} - z)] v_g (R (\tau^q) - X)) \mu (\tau^q).
\]

If this condition holds (as well as (54)), then a separating equilibrium exists where, although no pork would be allocated under full information, regardless of the value of \( z \), the agenda setter does not obtain pork, and provides pork to the centrist when \( z = \bar{z} \) but not when \( z = \tilde{z} \). Conversely, when the inequality in (58) is reversed, then no pork is allocated.
and equilibrium is $\tau = \tau^q$ under both $\bar{z}$ and $\bar{z}$. No signaling takes place and the equilibrium is RPM as in Battaglini and Coate, but as a pooling equilibrium under asymmetric information. One sees that when RPM holds in both states under full information, there are conceptually two sub-regimes under asymmetric information, corresponding to one where pork is allocated in $z = \bar{z}$, the other where it is not ("Complete RPM"). This result reflects once again the possible signaling role of pork.

Pork will be distributed in what would be RPM under complete information if condition (58) holds, which is equivalent to (57). From this equation, we see that as we approach $\mu(\tau^q) = 1$ this equation must hold. With $\mu(\tau^q) > 1$ but $\mu(\tau^q)$ coming arbitrarily close to 1, the right hand side of this equation can be made arbitrarily close to 1. When $\mu(\tau^q)$ approaches 1, $\bar{z}v_g(R(\tau^q) - X)$ exceeds 1 by a non-infinitesimal margin. The left hand side of the equation is then 1 plus a second term, which is the non-infinitesimal and positive term $\bar{z}v_g(R(\tau^q) - X) - 1$, multiplied by the fraction, which is strictly positive. So as $\mu(\tau^q)$ approaches 1, the left hand side of the equation exceeds 1 by a non-infinitesimal margin, while the right hand side becomes arbitrarily close to 1. Thus the inequality must hold as $\mu(\tau^q)$ approaches 1.

Moreover, there are parameter values for which (58) is satisfied for any value of $X$. Under these parameter values, pork will always be provided when $z = \bar{z}$, and the region noted as "RPM" in Figure 2 would not exist. In this case, moreover, equilibrium is separating everywhere and the pooling equilibrium never exists. Since our derivation puts no restriction on the excess of $\alpha$ over $\bar{z} - z$, the term $\alpha - (\bar{z} - z)$ on the right-hand side of (58) may be arbitrarily small, in which case the right-hand side approaches $\mu(\tau^q)$. The inequality is therefore satisfied due to (54), for any value of $X$.

In that part of the complete-information RPM region in which the $z = \bar{z}$ agenda setter separates from $z = \bar{z}$ through the provision of pork ("Pork RPM"), one can further show that it is unique, that is, that no pooling equilibrium survives refinement. The details of the argument are given in Appendix B.

Finally, if and when condition (58) does not hold (in the leftmost part of Figure 2), there is a pooling equilibrium in which no pork is given ("Complete RPM") and no information is revealed. The equilibrium is the status quo. Hence, pooling exists only when separation is impossible because pork is endogenously unavailable, due for example, to a low level of available revenues (high $X$). We discuss this possibility further below and show that for
reasonable parameter values condition (58) holds for any $X$ so that the only RPM equilibrium is one with pork.

6.3.2 Illustration of allocation of pork

This result that pork is allocated in $z = \bar{z}$ under asymmetric information in cases where RPM holds both states under full information may be better understood from Figure 3, showing points of indifference with the status quo and the (blue) budget line. Signaling of the state $\bar{z}$ requires the agenda setter when $z = \bar{z}$ to separate herself from the agenda setter when $z = \underline{z}$. Hence, signaling requires a non-empty lens between the green indifference curve (for the case when $z = \bar{z}$) and the black indifference curve (for the case where $z = \underline{z}$), where both are drawn under the assumption that the agenda setter gets no pork (an assumption that is confirmed in equilibrium). For any proposed tax rate, separating requires the agenda setter to propose a level of public good below the green line, which are levels of the public good that the agenda setter would not tolerate at that tax rate if $z = \bar{z}$. She will never propose less of the public good than implied by the black line, as she prefers the status quo to such a policies.

The vertical distance between the budget constraint and the level of public good proposed will be given to the centrist in the form of pork $s^C$. The agenda setter will not propose pork for herself, as it does not help separate herself from the agenda setter when $z = \bar{z}$, and provides her with a lower marginal utility than that of public good provision. Destroying resources rather than providing them to the centrist would not be effective either, as the centrist’s participation constraint will be binding in equilibrium.

The red indifference curve is that of the centrist when it has been revealed that $z = \bar{z}$, and takes into account that the centrist receives all residual pork, so it represents his participation constraint in the coalition conditional on his having learned the state $\bar{z}$. An equilibrium is the intersection of the green and the red lines (so that the separating and the centrist’s participation constraints are both binding and determine the equilibrium). As long as the red line is below the green line somewhere to the left of the status quo a separating equilibrium in which pork is provided is feasible.

When $z = \bar{z}$ the agenda setter will not choose to mimic the $z = \bar{z}$ equilibrium, and therefore $z = \underline{z}$ is known to the centrist. As we have seen, with this information set, the
which of the subregimes obtains depends on parameter values, that is, $\varepsilon$ and $X$, as well as on the distance between $\alpha$ and $\bar{z} - z$. $\varepsilon$ is literally the elasticity of labor supply, but mainly determines the degree of tax distortions, and could be interpreted as the inefficiency inherent in the tax system. $X$, the level of pre-existing spending obligations, could represent non-discretionary spending that cannot be changed in a crisis, including, but not limited to, debt service obligations. We have suggested this last interpretation as it allows us to examine the influence of existing debt on the choice of legislators of whether or not to allocate pork, a central question in the analysis of Battaglini and Coate.

Under some parameter values, we have noted that “Complete RPM” does not exist. Under other parameter values, high enough $X$ will imply that the inequality in (58) is reversed so that no pork is allocated and we are in “Complete RPM” as in Battaglini and Coate. Hence, our results support the general conclusion of their model that for high enough debt, the political equilibrium may be one without pork. In our model, however, there are always intermediate levels of $X$, where the economy would be in RPM in Battaglini and Coate, while pork is provided for informational purposes in this model. Preliminary
computations show that the level of \( X \) yielding “Complete RPM” is quite high. For \( \varepsilon = 1.6 \) (following Greenwood, Hercowitz and Huffman, 1988) and the difference between \( \bar{z} \) and \( \bar{\bar{z}} \) set to allow \( \bar{\bar{z}} \) to reflect a 2-standard deviation increase in government consumption in U.S. data, \( X \) must take up around 90% of the budget for the regime to be “Complete RPM”. We explored a range of \( \alpha \) values, from those slightly larger than \( \bar{z} - \bar{\bar{z}} \) to those that make ideology twice as important than policy, and this figure never declines below 82%. Even adding entitlements to debt service, this is well above what is observed in OECD economies. Hence, the case of “pork RPM” does not appear to be pathological or a fluke.

7 When is Pork Welfare Improving?

We have concentrated on a positive analysis of pork, showing how pork may allow information transmission about the state of nature which would be impossible in the absence of pork. Can pork improve welfare relative to the case in section 5.2 where pork is outlawed?

To begin, it is easy to show that the pork RPM equilibrium illustrated in Figure 3 is not welfare improving relative to the no pork status quo. At any \( \{g, \tau, \{s^i\}\} \), the utility of the centrist when \( z = \bar{z} \) is given by

\[
U(z) = \hat{u}(\tau) + \bar{z}v(g) + s^C.
\]

Utility of the representative agent is:

\[
U = \hat{u}(\tau) + \bar{z}v(g) + \sum \frac{s^i}{3}\]

\[
= \hat{u}(\tau) + \bar{z}v(g) + \frac{s^C}{3} \tag{59}
\]

where the second line follows from the fact that in pork RPM only the centrist receives pork.

Given that in pork RPM the centrist’s participation constraint is binding, we have \( U(z) - U^q(z) = 0 \), where \( U^q(z) \) is the utility of the centrist in status quo. But as \( U = U(z) - \frac{s^C}{3} \), it must be the case that this policy is welfare reducing.

Intuitively, the reason that the political equilibrium with pork implies lower welfare than when pork is not allowed is that the agenda setter extracts all surplus, due to the assumption that she may make take-it-or-leave-it (TOL) offers. This means that the centrist’s partic-
ipation constraint is always binding in this equilibrium and he receives no surplus. Since ideology dominates policy (case III, which is precisely what gives pork an informative role), the agenda setter will use her agenda setting power to push policy farther to the left (higher \( g \)) than is socially optimal. Hence the bargaining protocol implies that the centrist – whose preferences over public goods mirror those of the “average district” – is left just indifferent between the status quo and the equilibrium proposal. When combined with the assumption that the status quo is, by definition, one where no pork is given, the result is that pork must lower welfare.

Since it is the power given to the agenda setter under the TOL bargaining protocol which is central to the welfare result above, it is natural to ask whether other bargaining protocols would have a similar implication. A general answer to that question depends on the set of feasible bargaining outcomes, which is why the positive analysis we have presented is important. The set of bargaining outcomes is the set of points that are above both the red and black lines (so that both legislators agree to participate) and below the green line (so that information is conveyed) in Figure 3. Are there points inside this “lens” that welfare dominate the status quo? If so, a bargaining protocol the agenda-setter does not have all the bargaining power can imply a political equilibrium that is not only quantitatively different but qualitatively different as well, in that social welfare is higher.\(^{16}\)

Consider parameter values so that \( \alpha \) approaches \( \bar{z} - \underline{z} \) from above. We have seen in section 6.3 that with these parameter values pork will always be provided when \( z = \bar{z} \). With \( \alpha \) arbitrarily close to \( \bar{z} - \underline{z} \), \( \bar{z} + \alpha \) is arbitrarily close to \( \bar{z} \). This means that the indifference curve of the centrist without pork is everywhere arbitrarily close (from above) to the green line. The with-pork indifference curve of the representative agent is however strictly below this line (and therefore strictly below the green line) as the (59) shows that the utility of the representative agent is obtained by adding \( \frac{s_C}{3} \) to the no-pork utility of the centrist. We may represent this in Figure 4, which adds this indifference curve, represented by the dotted line, to Figure 3.

Any equilibrium policy above the dotted line, the indifference curve of the representative agent that runs through the status quo, is welfare increasing. Thus the region between the

\(^{16}\)This is a more general result in political models. A bargaining protocol such that bargaining power is interior implies qualitatively different results to one where one side may make TOL offers, sometimes substantially so. See Drazen and Limão (2008).
dotted line and the green line is the set of policies that are within the bargaining set of the agenda setter and the centrist that are welfare improving. A bargaining protocol that instead of leading to the extreme outcome represented by the square in this figure, leads to such a point within the bargaining set, would lead to a welfare-improving equilibrium.

Since the bargaining set with pork includes outcomes that imply higher welfare than when pork is restricted to be zero, the question becomes whether such outcomes are politically feasible. That is, is there a legislative decision-making mechanism that will imply one of these outcomes as the political equilibrium? As already indicated this would be one in which the agenda-setter cannot make TOL offers, that is, where instead of a “closed-amendment” protocol, there is an “open-amendment” protocol allowing coalition members to make counterproposals in the political process. Analyzing what equilibria would obtain under alternative, more realistic legislative decision-making procedures – and hence the welfare consequences of pork under those processes – is the next item on our research agenda.

8 Conclusions

Pork-barrel spending is generally viewed as “politics as usual” with lawmakers choosing to make expenditures to benefit their constituents at the general expense and to be distinguished from “responsible policy making” when public goods have high value. In this paper we have
re-examined this view when all legislators are not equally informed and differ in the value they assign to public spending in the current economic situation. We argued that once one considers legislators who are heterogeneous both in ideology and their information about the economic situation, allocation of pork may serve a function in the legislative process of enabling the formation of coalitions to pass legislation appropriate to the situation.

Pork “greases the wheels” of the legislative process, but does this not by bribing legislators to accept legislation they view as harmful, but by conveying information about the state of the world and hence the value of policy change. We showed that it may be impossible to convey such information if signaling must be done via policies that affect welfare directly. Hence, conceptually, we think it is incorrect to argue that pork is simply “politics as usual” that is a sign of the absence of responsible policy-making. As we argued in the previous section, pork is not antithetical to “responsible policy making” but in fact may be crucial to policy being able to respond to a high valuation of the public good.

More generally, our results suggest that if signaling the value of policy change is important, it may better to use changes in policy that has no direct social benefit to convey information and build coalitions rather than using changes in policy with direct social benefits. Or, a leader may want to signal the importance she assigns to larger policy goals (for example, energy independence) by forgoing her preferred policy on smaller goals (for example, by allowing offshore oil drilling in specific areas).

Our arguments are in line other work in political economy arguing that specific political institutions may be useful in conveying information. This may explain complex procedures, for example, standing committees and restrictive amendment procedures, as in Gilligan and Krehbiel (1987). As in the case of pork, information transmission may be important in an otherwise reviled practice, for example, special interest lobbies who have superior information about the effect of policies.

What should a reader take away from the paper? We think the general message is three-fold. First, in analyzing how legislatures operate, assuming homogeneous legislators may be reasonable for some questions but not others. This is more than the argument that heterogeneity is the *sine qua non* of political economy (Drazen, 2000); this is well recognized.

\[\text{17} \]

A related positive consideration is the possibility of changing policy across broad categories, as opposed to redistributing benefits of existing policy – for example, changing level highway expenditure versus changing where the roads are built. Brender and Drazen (2009) find that leaders have no effect on the composition of expenditures in the short run.
It is the argument that the nature of heterogeneity may be crucial in analyzing political phenomena and especially how legislatures operate. Second, and more specifically, since coalition-building among legislators with different preferences is crucial to passing legislation, the allocation of pork or “favors” will play a role in the process. This too is recognized. Our addition is to show that this role may be for better-informed legislative leaders to convince less-informed legislators of the need for policy changes. Third, and most generally, our paper presents yet another example of pitfalls in using representative agent models.
References


APPENDICES

A Policy choice when \( z = \bar{z} \)

In this appendix we set out the analysis of the full information case when \( z = \bar{z} \) discussed in section 4.3. When \( z = \bar{z} \), the parameter assumptions imply

\[
\mu (\tau^q) < \bar{z} v_g (R (\tau^q) - X) < (\bar{z} + \alpha) v_g (R (\tau^q) - X) .
\]

Analogous to the case of \( z = \bar{z} \), the location of 1 relative to the terms in this inequality will determine in part the regime in which the legislative process operates. Consider first whether the marginal cost of taxation at \( \tau^q \) is greater or less than unity.

If \( \mu (\tau^q) > 1 \), so that

\[
1 < \mu (\tau^q) < \bar{z} v_g (R (\tau^q) - X) < (\bar{z} + \alpha) v_g (R (\tau^q) - X) ,
\]

we are in RPM. Neither legislator would be willing to increase taxes in order to distribute pork, even if his own district were the sole beneficiary. However, both legislators agree that government expenditures are too low and that taxes should be increased in order to finance them. The equilibrium policy in this case is the minimum of \( \bar{\tau}^q (\bar{z}) \) and \( \tau^* (\bar{z} + \alpha) \) (as in (27) in the text), where \( \bar{\tau}^q (\bar{z}) \) is the policy that gives the centrist the same utility as \( \tau^q \) (as in (28) in the text).

The logic is as follows. Though legislators agree that the value of the public good exceeds the marginal cost of taxation, they disagree about the extent to which taxes and public expenditures should increase. The agenda setter proposes her preferred policy \( \tau^* (\bar{z} + \alpha) \), if the centrist prefers this policy to the status quo. If, however, \( \tau^* (\bar{z} + \alpha) \) is so high that it leaves the centrist worse off than in the status quo, the agenda setter proposes the highest level of taxation and of the public good that is acceptable to the centrist, \( \bar{\tau}^q (\bar{z}) \). The equilibrium proposal is thus the smaller of the agenda setter’s first-best policy and the highest tax rate that the centrist would accept, as in (27).

If \( \mu (\tau^q) < 1 \), the nature of the equilibrium now depends on the ranking of \( \mu (\bar{\tau}^q), \mu (\tau^* (\bar{z} + \alpha)) \), and the number 1. There are four cases depending on the relation between \( \mu (\tau) \) and 1, as follows:

1) \( \bar{\tau}^q (\bar{z}) < \tau^* (\bar{z} + \alpha), \mu (\bar{\tau}^q (\bar{z})) < 1 \): By increasing taxes and government expenditure with no pork we reach

\[
\bar{z} v_g (R (\bar{\tau}^q (\bar{z})) - X) < \mu (\bar{\tau}^q (\bar{z})) < 1 < (\bar{z} + \alpha) v_g (R (\bar{\tau}^q (\bar{z})) - X) .
\]

This ranking is identical to the one in (22) for \( z = \bar{z} \), and as in that case, we will be in (at least partial) BAU iff

\[
\frac{(\bar{z} + \alpha) v_g (R (\bar{\tau}^q (\bar{z})) - X)}{1 - \bar{z} v_g (R (\bar{\tau}^q (\bar{z})) - X) } > \frac{\mu (\bar{\tau}^q (\bar{z}))}{1 - \mu (\bar{\tau}^q (\bar{z}))} .
\]

(60)
2) \( \bar{\tau}^q (\bar{z}) < \tau^* (\bar{z} + \alpha), \mu (\bar{\tau}^q (\bar{z})) > 1 \): We have the following ranking

\[
1 < \mu (\bar{\tau}^q (\bar{z})) < (\bar{z} + \alpha) v_g (R(\bar{\tau}^q (\bar{z})) - X)
\]

and clearly we are in RPM.

3) \( \tau^* (\bar{z} + \alpha) < \bar{\tau}^q (\bar{z}), \mu (\tau^* (\bar{z} + \alpha)) < 1 \): , then we have

\[
\bar{z} v_g (R(\tau^* (\bar{z} + \alpha)) - X) < \mu (\tau^* (\bar{z} + \alpha)) = (\bar{z} + \alpha) v_g (R(\tau^* (\bar{z} + \alpha)) - X) < 1.
\]

Since the equilibrium policy \( \tau^* (\bar{z} + \alpha) < \bar{\tau}^q (\bar{z}) \), the centrist is still strictly better off than the status quo, so his participation constraint is slack. Since the marginal cost of raising revenue is less than the value of pork at the agenda setter’s most preferred policy, she will allocate pork in equilibrium, at least to herself. The agenda setter would increase taxes and lower public expenditures in favor of pork, while leaving \( \mu (\tau) = (\bar{z} + \alpha) v_g (g) \) until one of two things happens. One possibility is that \( \tau \) will have increased and \( g \) will have decreased sufficiently so that \( \mu (\tau) = (\bar{z} + \alpha) v_g (g) = 1 \), at which point the agenda setter is no longer willing to increase taxes or cut expenditures, even though her district is the sole beneficiary of pork. In this case we are in Partial BAU where the agenda setter but not the centrist gets pork. The other possibility is that \( \tau \) is increased until

\[
\hat{u} (\tau) + \bar{z} v (g) = \hat{u} (\tau^q) + \bar{z} v (g^q),
\]

that is, taxes are so high and expenditures so low enough that the centrist will no longer agree to further tax increases unless he himself benefits in some way. At this point, the agenda setter can attempt to gain the centrist’s support for further tax increases if and only if \( \mu (\tau) < \frac{1}{2} \) (by dividing the dollar of tax revenues as pork between the two districts). In this case, that we are in Complete BAU where both legislators get pork and \( \mu (\tau^* (\bar{z} + \alpha)) < \frac{1}{2} \).

4) \( \tau^* (\bar{z} + \alpha) < \bar{\tau}^q (\bar{z}), \mu (\tau^* (\bar{z} + \alpha)) > 1 \): we have

\[
1 < \mu (\tau^* (\bar{z} + \alpha)) = (\bar{z} + \alpha) v_g (R(\tau^* (\bar{z} + \alpha)) - X).
\]

and

\[
\bar{z} v_g (R(\tau^* (\bar{z} + \alpha)) - X) < \mu (\tau^* (\bar{z} + \alpha)).
\]

Here the agenda setter is unwilling to increase taxes in favor of pork or public expenditures, while the centrist’s participation constraint is slack. The equilibrium is \( \tau = \tau^* (\bar{z} + \alpha) \) and we are in RPM.

To further explain the possibilities under \( \bar{\tau}^q (\bar{z}) \) in the text, note that when \( \mu (\bar{\tau}^q (\bar{z})) > \bar{z} v_g (R(\bar{\tau}^q (\bar{z})) - X) \), the centrist prefers lower taxes to higher public good provision. The agenda setter can therefore reduce the tax rate (giving the centrist a surplus of \( \mu (\bar{\tau}^q (\bar{z})) \) at
the margin) and reduce $g$ by

$$
\partial g = \frac{\mu(\bar{\tau}(\bar{z}))}{\bar{z}v_g(R(\bar{\tau}(\bar{z}))-X)} > 1,
$$

to leave the centrist indifferent. If when $(\bar{z}+\alpha)v_g(\cdot) < 1$ the agenda setter will choose to allocate $\partial g - 1 > 0$ units of tax revenues at the margin to pork for her own district. This will increase her utility if

$$
\mu(\bar{\tau}(\bar{z})) + \partial g - 1 - (\bar{z}+\alpha)v_g(R(\bar{\tau}(\bar{z}))-X)\partial g > 0,
$$

that is, the combined benefit to her of pork and lower taxes outweighs the cost of lost public good expenditure. These last two equations then give

$$
\left[\frac{\bar{z}}{\mu(\bar{\tau}(\bar{z}))} + \alpha\right]v_g(R(\bar{\tau}(\bar{z}))-X) < 1. \tag{61}
$$

Since the left hand side of this equation is decreasing in both $g$ and $\tau$, the agenda setter lowers public good provision (and reduces taxes to ensure the participation of the centrist) in favor of pork for her own district until

$$
\left[\frac{\bar{z}}{\mu(\tau)} + \alpha\right]v_g(\tau) = 1. \tag{62}
$$

This first-order condition combined with (13) and either

$$
\mu(\tau) = 1. \tag{63}
$$

or (11) holding with equality determine the equilibrium.\textsuperscript{18}

\textsuperscript{18}The last two conditions are intuitive when $\tau^*(\bar{z}+\alpha) < \bar{\tau}(\bar{z})$ and $\mu(\tau^*(\bar{z}+\alpha)) < 1$. The agenda setter will clearly take pork for herself in this case, as she prefers pork to low taxes or high public good provision, and the centrist’s participation constraint would be slack if she did not allocate pork to herself. She will therefore allocate pork to herself until one of two things occurs. Either taxes have increased such that the marginal cost of taxation equals the marginal value of pork; or, the participation constraint of the centrist is binding.
B Equilibrium Refinements

B.1 Complete BAU

Denote the proposal made by the agenda setter in state \( z = z \) by \( \delta^+_\bar{z}(z) \equiv \{ g^+_\bar{z}, \tau^{BAU}, s^+_{\bar{z}} \} \), where \( g^+_\bar{z} \) (that is, optimal \( g^+ \) at \( \bar{z} = z^e \)) is given by

\[
v'(g^+_\bar{z}) = \frac{1}{\bar{z} + z^e + \alpha}
\]

and \( s^+_{\bar{z}} \) (that is, \( s^\alpha_\bar{z} \) at \( \bar{z} = z^e \)) is given by (5), which may be written

\[
s^+_{\bar{z}} = R(\tau^{BAU}) - X + \hat{u}(\tau^{BAU}) - \hat{u}(\tau^q) + z^e [v(g^+_\bar{z}) - v(g^q)] - g^+_\bar{z}
\]

This policy provides the agenda setter of type \( z \) with utility

\[U_z(\delta^+_\bar{z}, \bar{z} = z^e) = R(\tau^{BAU}) - X + \hat{u}(\tau^{BAU}) - \hat{u}(\tau^q) + z^e [v(g^+_\bar{z}) - v(g^q)] - g^+_\bar{z},\]

denoted \( U_z(\delta^+_\bar{z}, \bar{z}) \) for “type” \( z = \bar{z} \). If the agenda setter mimics this proposal when \( z = \bar{z} \), she obtains \( s^+_{\bar{z}} \) defined by (64) and \( U_z(\delta^+_\bar{z}, z^e) \) defined by (65) for \( z = \bar{z} \). For her to mimic it must be the case that

\[
U_z(\delta^+_\bar{z}, z^e) \geq U^\alpha_{\bar{z}}
\]

where \( U^\alpha_{\bar{z}} \) is given by (46). Note that utility (65) could be written as

\[U_z(g, \bar{z}) = (z + \bar{z} + \alpha) [v(g) - v(g^q)] - g + K(\tau^{BAU}, \tau^q),\]

where \( K(\tau^{BAU}, \tau^q) \equiv R(\tau^{BAU}) + 2 [\hat{u}(\tau^{BAU}) - \hat{u}(\tau^q)] \) is identical across all candidate policies \( \delta \) the agenda setter may propose. (In both (65) and (67), the \( s^\alpha_\bar{z} \) consistent with political equilibrium is implicit in the derivation of \( U_z(\cdot) \).)

Though there may be pooling equilibria consistent with (66) that satisfy the conditions of a PBE, we now rule them out by showing they violate the Cho-Kreps intuitive criterion. We demonstrate this for the agenda setter when \( z = \bar{z} \) by showing there is a deviation from the pooling equilibrium that “type” \( \bar{z} \) would not mimic. An analogous demonstration would imply that when \( z = \bar{z} \) there is a deviation from the pooling equilibrium that “type” \( \bar{z} \) would not mimic.

Suppose there exists a feasible proposal \( \bar{\delta} \equiv \{ \bar{g}, \tau^{BAU}, \bar{z}^\alpha \} \) such that

\[
U_z(\bar{g}, \bar{z}) \geq U_z(g^+_\bar{z}, z^e)
\]

and

\[
U_z(\bar{g}, \bar{z}) \leq U_z(g^+_\bar{z}, z^e)
\]

for any \( \bar{z} \). If these inequalities hold, then the agenda setter in the state \( z = \bar{z} \) would deviate
It is easy to show that a proposal must always exist. (68) defines possible deviations \( \bar{g} \) for any \( \bar{z} > z^e \). Such deviations \( \bar{g} > g^+ \) must exist since

\[
\frac{\partial U_2(g, \bar{z})}{\partial \bar{z}} \bigg|_{g = g^+} = v(g^+) - v(g^a) > 0
\]

and

\[
\frac{\partial U_2(g, \bar{z})}{\partial g} \bigg|_{\bar{z} = z^e, g > g^+_z} = (\bar{z} + z^e + \alpha) v'(g) - 1 < 0
\]

where the second inequality follows from the definition of \( g^+ \) as the optimum at \( z^e \), so that \((\bar{z} + z^e + \alpha) v'(g^+) = 1\). One may then combine (68) and (69) to yield (after some algebra)

\[
(\bar{z} + \bar{z} + \alpha) [v(\bar{g}) - v(g^+_z)] \geq (z^e - \bar{z}) [v(g^+_z) - v(g^a)] + \bar{g} - g^+_z
\]

\[
\geq (\bar{z} + \bar{z} + \alpha) [v(\bar{g}) - v(g^+_z)]
\]

The first inequality defines possible deviations \( \bar{g} \) as above which induce agenda setter \( \bar{z} \) to separate. The second inequality limits \( \bar{g} \) for any \( \bar{z} > z^e \) to those \( \bar{z} \) won’t mimic. Since \((\bar{z} + \bar{z} + \alpha)(v(g^+_z) - v(\bar{g})) > (\bar{z} + \bar{z} + \alpha)(v(g^+_z) - v(\bar{g})) \) for \( \bar{z} > z \), this set is non-empty. Hence, there exist feasible proposals \( \bar{\delta} \) that would induce an agenda setter under \( \bar{z} \) to deviate from the pooling equilibrium \( \delta_+^+(z^e) \) which an agenda setter under \( \bar{z} \) would not mimic. Such a \( \bar{\delta} \) exists because the right-hand side of the first equation above can be chosen freely—we need only show that there exists some \( \bar{g} \) for which these inequality holds for all \( \bar{z} \).

Analogously, one may show by similar reasoning that there exists a feasible \( \bar{\delta} \equiv \{g, \tau^{BAU}, \bar{z}^\alpha\} \) with \( g < g^+_z \) such that the inequalities in (68) and (69) are reversed for \( \bar{z} \leq z^e \). Hence, there exist feasible proposals \( \bar{\delta} \) that would induce an agenda setter under \( \bar{z} \) to deviate from the pooling equilibrium \( \delta_+^+(z^e) \) which an agenda setter under \( \bar{z} \) would not mimic. Therefore, \( \delta_+^+(z^e) \) would then be an “unintuitive” equilibrium, that is, it would be ruled out by the Cho-Kreps intuitive criterion, as there exists profitable deviations for the agenda setter, either when \( z = \bar{z} \) or when \( z = \bar{z} \).

In simpler political terms, a proposal that does not reveal information (“pure bribing”) cannot be a legislative equilibrium since legislators know that in any economic situation, the agenda setter would want to choose some other proposal to reveal information.

We have shown that a profitable deviation exists from the best pooling equilibrium for the \( z = \bar{z} \) agenda setter. We now argue that this is true for all pooling equilibria. First, note that the best pooling equilibrium from the perspective of the \( z = \bar{z} \) agenda setter is the one that provides the highest level of \( g \), as the agenda setter would find it profitable to deviate from a proposal with any higher level of \( g \), regardless of \( z \). Second, a similar argument demonstrates that no pooling equilibrium would provide a lower level than \( g \) than the pooling equilibrium that is best for the \( z = \bar{z} \) agenda setter.

Now consider an alternative candidate for a feasible pooling equilibrium \( \hat{\delta} \). When \( z = \bar{z} \), this
pooling equilibrium must provide the agenda setter with lower utility than the pooling equilibrium that was the best from her perspective, by definition. Thus any deviation that was profitable from the best pooling equilibrium would also be profitable from the \( \delta \) pooling equilibrium. As for the \( z = \bar{z} \) state, the agenda setter would obtain

\[
U_{\bar{z}}(\hat{\delta}, \bar{z} = \bar{z}^e) = R(\tau^{BAU}) - X + 2[\hat{u}(\tau^{BAU}) - \hat{u}(\tau^q)] + (\bar{z} + \bar{z}^e + \alpha)[v(\hat{g}) - v(g^q)] - \hat{g}.
\]

with \( \hat{g} \) the proposed provision of the public good in the \( \hat{\delta} \) proposal. As long as \( \hat{g} \) is such that \( v'(\hat{g}) > \frac{1}{\bar{z}^e + \bar{z}^e + \alpha} \) (the agenda setter’s best pooling equilibrium when \( z = \bar{z} \)), \( \hat{\delta} \) provides higher utility to the \( z = \bar{z} \) agenda setter than \( g_{\bar{z}}^+ \). Thus the \( z = \bar{z} \) agenda setter would not want to deviate from \( \hat{\delta} \) to any policy she was unwilling to accept under the \( \delta^+_{\bar{z}}(\bar{z}^e) \) candidate equilibrium. Thus with the intuitive criterion, a profitable deviation exists from any candidate pooling equilibrium. Therefore, as long as pork is available, no perfect Bayesian equilibrium that satisfies the intuitive criterion has the agenda setter propose the same proposal in states \( z = \bar{z} \) and \( z = \bar{z} \).

**B.2 RPM**

We here show that in the region where “Pork RPM” exists as a separating equilibrium, it is the unique equilibrium that satisfies the intuitive criterion. We first note that a pooling equilibrium exists, and that the unique pooling equilibrium is the status quo. In a pooling equilibrium, the centrist’s beliefs are \( \bar{z} = \bar{z}^e \). Recalling that the status quo was determined such that \( \mu(\tau^q) = \bar{z}^e v_g(g^q) \). The agenda setter cannot therefore obtain the support of the centrist for a different \( (\tau, g) \) policy mix, without bribing the centrist. If \( \mu(\tau^q) = \bar{z}^e v_g(g^q) > 1 \), however, no such bribe is feasible as there is no mix of public good and pork that would outweigh the cost of taxation from the centrist’s perspective. Therefore, if \( \mu(\tau^q) > 1 \) the only pooling equilibrium is at status quo. Note that this equilibrium is implicitly supported by off-the-equilibrium-path beliefs of the centrist that \( \bar{z} = \bar{z}^e \) if any proposal other than the status quo is observed. (It would be similarly supported if \( \bar{z} = \bar{z} \) off the equilibrium path.) It should be apparent that if (58) holds this equilibrium does not survive refinement under the Intuitive Criterion. An obvious deviation possible for the \( z = \bar{z} \) agenda setter in this case is to propose the Partial-BAU separating equilibrium policy. As the pooling equilibrium is at the status quo, by the definition of the separating equilibrium, this deviation would be profitable for the agenda setter when \( z = \bar{z} \) but not when \( z = \bar{z} \). Thus it would be unintuitive for the centrist to maintain his beliefs that \( \bar{z} = \bar{z}^e \) if the separating proposal is observed.

When \( \mu(\tau^q) < 1 \) the situation is different. An analysis similar to the one of in section 4.2 for Partial BAU under complete information when \( z = \bar{z} \) leads to the conclusion that if \( \bar{z} = \bar{z}^e \), the \( z = \bar{z} \) agenda setter can bribe the centrist to increase public good provision, and finds it optimal to do so, if

\[
\frac{(\bar{z} + \alpha) v_g(g^q)}{1 - \bar{z}^e v_g(g^q)} > \frac{\mu(\tau^q)}{1 - \mu(\tau^q)}.
\]
Given that $z^e > \bar{z}$ and $\bar{z} > \tilde{z}$, there must be a portion of the state space where such a bribe is feasible under asymmetric information and $z = \bar{z}$, but where (23) still does not hold, and thus we are in region A. In other words, in a portion of the state space demarcated by

$$\frac{(\bar{z} + \alpha) v_g (g^q)}{1 - z^e v_g (g^q)} > \frac{\mu (\tau^q)}{1 - \mu (\tau^q)} > \frac{(\tilde{z} + \alpha) v_g (g^q)}{1 - \tilde{z} v_g (g^q)}.$$

there exists a pooling equilibrium where the agenda setter, regardless of $z$, bribes the centrist, who believes $\tilde{z} = z^e$ on observing this proposal, to accept higher taxes and public good provision. This pooling equilibrium can only be sustained, however, with an off-the-equilibrium-path belief $\tilde{z} < \bar{z}$ on observing the $z = \bar{z}$ agenda setter’s separating proposal. But this off-the-equilibrium-path belief is ruled out by the Cho-Kreps criterion as the $z = \tilde{z}$ agenda setter is strictly worse off proposing the separating proposal than proposing the pooling proposal (the separating proposal is equilibrium dominated for $z = \tilde{z}$). Thus the centrist’s beliefs must have $\tilde{z} = \bar{z}$ on observing the separating proposal off-equilibrium. With these new off-equilibrium beliefs, the pooling equilibrium is no longer sustained: the $z = \bar{z}$ agenda setter is strictly better off in the separating equilibrium than in the pooling equilibrium.