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Special Interest Politics: Contribution Schedules versus Nash Bargaining

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WiSo-HH Working Paper Series
Working Paper No. 30
February 2016

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ISSN 2196-8128

Font used: "TheSans UHH" / LucasFonts

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Special Interest Politics: Contribution Schedules versus Nash Bargaining

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This Version: January 2017

Abstract

The article compares two models of lobby influence on policy choice: The Grossman and Helpman (1994) contribution-schedules model and a negotiation between the lobbies and the government summarized by a Nash-bargaining function. The literature uses the models interchangeably because they imply the same equilibrium policy. We derive under which conditions they lead to the same equilibrium payments and utilities. They coincide under particular assumptions about bargaining power and disagreement utility. Moreover, we indicate that the models usually lead to different sets of lobbies and policies if these sets are endogenous.

Keywords: Common-Agency Model, Lobbying, Nash Bargaining, Political Economy, Policy Distortions
JEL: C71, C78, D72

1. Introduction

The political common-agency model of Grossman and Helpman (1994) is the workhorse model of a large literature on lobby influence. The model has been developed as a framework to analyze protectionist trade policies, and has been used in many empirical analyses in this field – see, for instance, Goldberg and Maggi (1999), Gawande and Bandyopadhyay (2000), Mitra et al. (2002, 2006) and Kee et al. (2007). It has been extended (e.g. Bergemann and Välimäki, 2003; Martimort and Semenov, 2007) and applied to many other policy fields – for example to environmental policy (e.g. Aidt, 1998; Fredriksson and Svensson, 2003; Fredriksson et al., 2003; Datt and Mehra, 2016) and regulatory capture (Slinko et al., 2005).

The model assumes that the government would like to maximize welfare, but it is willing to deviate from this aim if it receives *contribution payments* as a compensation. Its counterparts are the organized special-interest groups or *lobbies*. Before the government chooses policy, they simultaneously confront it with *contribution schedules* defining payments as functions of the policy. The government then chooses policy taking these schedules into account.

The basic contribution-schedules model assumes that all agents have constant marginal utility of money. Equilibrium policy then maximizes a weighted sum of welfare and profits of all sectors with lobbies. This would also be the outcome of an alternative policy process: (Multilateral) Nash bargaining between the government and the lobbies. While Grossman and Helpman (2001, p. 247) dismiss the possibility of bargaining with all lobbies because “the policymaker would not wish to be seen as openly peddling her influence”, several authors use the Nash-bargaining model, stating that the two models of political interaction are equivalent. This is a common assumption in the trade literature (e.g., Goldberg and Maggi, 1999; Maggi and Rodríguez-Clare, 2000; McCalman, 2004 and Gawande et al., 2009), and also in other applications (e.g., Dharmapala, 1999; Schleich, 1999).[1] These papers focus on the choice of policy, however, while not analyzing the equilibrium contribution payments.[2]

The contribution of the present article is to compare the two models' properties with respect to equilibrium payments and utilities. A clear understanding of the differences between multilateral bargaining and the common-agency setting is relevant for three reasons. Firstly, it is worthwhile to verify the claim of a part of the literature that they are equivalent. Secondly, there are situations that may be described by both models, and researchers should be aware of the different model implications and requirements. Thirdly, if the models have different distributional implications for the special-interest groups, this implies that different special-interest groups will be politically active if such activity is costly; moreover, the interest groups' preferences for allowing more or less efficient policy will be different, such that they have different preferences for the design of institutions and constitutions. Therefore, it is relevant for an economy's long-run allocation whether its political process resembles one or the other model.

We proceed as follows. The following Section 2.1 introduces the agents, Sections 2.2 and 2.3 analyze the policy-choice mechanisms, and Section 2.4 discusses different assumptions for behavior in case of disagreement. Section 3 compares the models for

[1] It may be debatable whether the Nash bargaining solution (NBS) constitutes a positive model in the first place. One reason for us to analyze its properties is that the NBS is used as a positive model in many articles. Let us sketch a second reason for an affirmative answer. Binmore (2011, p. 27; 2014) argues that evolution has provided humans with fairness norms that allow cooperation even in situations in which actual bargaining cannot take place, or is too costly. If the NBS is a plausible model of such a fairness norm, as Binmore suggests, then it becomes a positive model – in particular for the interaction between the lobbies and the government, which often takes place covertly and, thus, may not take the form of a formal negotiation.

[2] This kind of lobby model can also be applied to the political influence of foreign lobbies. For example, different organizations from industrial countries may simultaneously try to influence the policy in a developing country, a question we address in Schopf and Voss (2016).

given sets of lobbies and policies, indicates why these sets are usually different and concludes.

2. The Models

2.1. The Agents

Lobbies influence policy by paying contributions to a government. Denoting the policy vector by $\mathbf{p} = \{p_k\}_{k \in K}$, the utility of lobby $i \in L$ is a linear combination of its gross utility $W_i(\mathbf{p})$ and a cost of paying contributions c_i:

$$V_i = W_i(\mathbf{p}) - b_i c_i \qquad\qquad b_i \geq 0. \tag{2.1a}$$

Similarly, the government's utility G depends on welfare $W(\mathbf{p})$ and contribution payments $\mathbf{c} = \{c_i\}_{i \in L}$:

$$G = W(\mathbf{p}) + \sum_{i \in L} a_i c_i \qquad\qquad a_i \geq 0. \tag{2.1b}$$

All $W_i(\mathbf{p})$ and $W(\mathbf{p})$ are assumed to be continuous and single-peaked in $\mathbf{p}$ with different maximizing policy vectors.

This setting is identical to that of Grossman and Helpman (1994) except for minor notational adjustments that ease the exposition later on, and for the fact that both the cost of paying and the government's valuation of receiving contributions may be lobby-specific. A natural interpretation for $W_i(\mathbf{p})$ is gross profit of sector i (suggesting $b_i \geq 1$, and $b_i > 1$ if there are additional costs of collecting contributions), and $W(\mathbf{p})$ would be gross aggregate welfare including that of sectors without a lobby, $W(\mathbf{p}) \equiv \sum_i W_i(\mathbf{p})$.

2.2. Contribution-Schedules Equilibrium

Grossman and Helpman (1994) derive the subgame-perfect equilibrium of a two-stage game. In the first stage, the lobbies simultaneously and non-cooperatively offer *contribution schedules* to the government, defining payments as a function of the policy: $c_i = C_i(\mathbf{p})$. Afterwards, the government chooses policy so as to maximize its utility, given the contribution schedules. Letting a superscript o denote equilibrium, we have

$$\mathbf{p}^\circ = \underset{\mathbf{p}}{\operatorname{argmax}} \left[W(\mathbf{p}) + \sum_{i \in L} a_i C_i(\mathbf{p}) \right]. \tag{2.2}$$

Lobbies cannot offer negative contributions. For positive contributions, attention is restricted to *truthful contribution schedules*, in which a lobby's marginal payment cost equals its marginal utility gain due to the policy. This determines each contribution schedule up to a constant $B_i \geq 0$:

$$b_i C_i(\mathbf{p}) = \max\left[0, W_i(\mathbf{p}) - B_i\right] \qquad \text{for } i \in L. \tag{2.3}$$

(2.2) and (2.3) imply that the equilibrium policy maximizes a weighted sum of welfare and gross utilities:

$$\mathbf{p}^\circ = \underset{\mathbf{p}}{\operatorname{argmax}} \left[W(\mathbf{p}) + \sum_{i \in L} \frac{a_i}{b_i} W_i(\mathbf{p}) \right]. \tag{2.4}$$

Lobby i's policy weight $\frac{a_i}{b_i}$ equals the ratio of the marginal utility of the government of receiving the lobby's money to the lobby's marginal payment cost. Finally, each contribution schedule must minimize the lobby's payment cost $b_i c_i$ subject to the constraint that the government is better off by accepting it instead of rejecting it and receiving no contributions from the lobby. Thus, lobby i sets the government indifferent between choosing the optimal policy without the lobby,

$$\mathbf{p}^{-i} = \underset{\mathbf{p}}{\operatorname{argmax}} \left[W(\mathbf{p}) + \sum_{j \in L \setminus i} a_j C_j^\circ(\mathbf{p}) \right], \tag{2.5}$$

and the equilibrium policy with lobby i, $\mathbf{p}^\circ$:

$$W(\mathbf{p}^{-i}) + \sum_{j \in L \setminus i} a_j C_j^\circ(\mathbf{p}^{-i}) = W(\mathbf{p}^\circ) + \sum_{j \in L} a_j C_j^\circ(\mathbf{p}^\circ) \qquad \text{for } i \in L. \tag{2.6}$$

Rearranging (2.6) and substituting (2.3) yields

$$C_i^\circ(\mathbf{p}^\circ) = \frac{1}{a_i} \left[W(\mathbf{p}^{-i}) + \sum_{j \in L \setminus i} \frac{a_j}{b_j} W_j(\mathbf{p}^{-i}) - W(\mathbf{p}^\circ) - \sum_{j \in L \setminus i} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) \right] > 0 \quad \text{for } i \in L. \tag{2.7}$$

In equilibrium, each lobby pays what the government and the other lobbies lose by accommodating that lobby. Substituting (2.4) and (2.7) for all lobbies into (2.1) yields the equilibrium utilities:

$$V_i^\circ = W_i(\mathbf{p}^{-i}) + \frac{b_i}{a_i} \left[W(\mathbf{p}^\circ) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) - W(\mathbf{p}^{-i}) - \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^{-i}) \right] \text{ for } i \in L, \tag{2.8a}$$

$$G^\circ = \sum_{i\in L} \frac{W(\mathbf{p}^{-i})}{|L|} + (|L|-1)\left[\sum_{i\in L}\left[\frac{W(\mathbf{p}^{-i})}{|L|} + \sum_{j\in L\setminus i}\frac{a_j}{b_j}\frac{W_j(\mathbf{p}^{-i})}{|L|-1}\right] - W(\mathbf{p}^\circ) - \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ)\right]. \tag{2.8b}$$

The term in square brackets in (2.8a), which represents the lobby's gain of offering a contribution schedule, is positive by (2.4). Each lobby's equilibrium utility is the utility it would have without offering contributions, plus a share of the additional joint surplus due to its cooperation. Similarly, the government's equilibrium utility is the utility it would have on average if one lobby did not pay any contributions, plus the joint loss of the government and the other $|L|-1$ lobbies on average due to the participation of the residual lobby. This joint loss must be offset by $|L|-1$ lobbies. If there were just one lobby, it would just compensate the government for the welfare loss.

2.3. Nash Bargaining Solution

In this section, we drop the notion of a simultaneous offering of contribution schedules. Instead, the government and all lobbies meet and bargain. The outcome is determined by an asymmetric Nash bargaining solution, which implements the policy and the profile of contribution payments that maximize the Nash product $N(\mathbf{p},\mathbf{c})$. Using a superscript n to denote the outcome of bargaining, we have

$$N(\mathbf{p},\mathbf{c}) = \left[W(\mathbf{p}) + \sum_{i\in L} a_i c_i - G^d\right]^\gamma \cdot \prod_{i\in L}\left[W_i(\mathbf{p}) - b_i c_i - V_i^d\right]^{\gamma_i}, \tag{2.9a}$$

$$(\mathbf{p}^n,\mathbf{c}^n) \in \operatorname*{argmax}_{\mathbf{p},\mathbf{c}} N(\mathbf{p},\mathbf{c}), \tag{2.9b}$$

where γ_i denotes the *bargaining power* of lobby i and γ that of the government. V_i^d and G^d are the respective utility values in case of disagreement (see below). The first-order conditions for maximizing (2.9) are

$$\left[\frac{\gamma\partial W(\mathbf{p}^n)/\partial p_k}{W(\mathbf{p}^n) + \sum_{j\in L} a_j c_j^n - G^d} + \sum_{j\in L}\frac{\gamma_j \partial W_j(\mathbf{p}^n)/\partial p_k}{W_j(\mathbf{p}^n) - b_j c_j^n - V_j^d}\right] N(\mathbf{p}^n,\mathbf{c}^n) = 0 \quad \text{for } k\in K, \tag{2.10a}$$

$$\left[\frac{\gamma a_i}{W(\mathbf{p}^n) + \sum_{j\in L} a_j c_j^n - G^d} - \frac{\gamma_i b_i}{W_i(\mathbf{p}^n) - b_i c_i^n - V_i^d}\right] N(\mathbf{p}^n,\mathbf{c}^n) = 0 \quad \text{for } i\in L. \tag{2.10b}$$

With $N(\mathbf{p}^n,\mathbf{c}^n) > 0$, rearranging (2.10b) and substituting into (2.10a) yields

$$\frac{\partial W(\mathbf{p}^n)}{\partial p_k} + \sum_{j\in L}\frac{a_j}{b_j}\frac{\partial W_j(\mathbf{p}^n)}{\partial p_k} = 0 \qquad \text{for } k\in K, \tag{2.11}$$

so that the bargained policy can be written as

$$\mathbf{p}^n \in \underset{\mathbf{p}}{\operatorname{argmax}} \left[W(\mathbf{p}) + \sum_{i \in L} \frac{a_i}{b_i} W_i(\mathbf{p}) \right], \tag{2.12}$$

which is identical to $\mathbf{p}^\circ$ from (2.4). Solving (2.10b) as a system of equations defining c_i^n for $i \in L$ yields

$$\begin{aligned} c_i^n = {} & \frac{1}{b_i} \frac{\gamma + \sum_{j \in L \setminus i} \gamma_j}{\gamma + \sum_{j \in L} \gamma_j} \left[W_i(\mathbf{p}^\circ) - V_i^d \right] \\ & + \frac{1}{a_i} \frac{\gamma_i}{\gamma + \sum_{j \in L} \gamma_j} \left[G^d + \sum_{j \in L \setminus i} \frac{a_j}{b_j} V_j^d - W(\mathbf{p}^\circ) - \sum_{j \in L \setminus i} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) \right] \quad \text{for } i \in L. \end{aligned} \tag{2.13}$$

Thus, each lobby pays a share of what it gains due to cooperation plus a share of what the government and the other lobbies lose due to its cooperation. If its bargaining power is low ($\gamma_i \to 0$), it contributes all its gains, if its bargaining power is high ($\gamma_i \to \infty$), it just compensates the others. Substituting (2.13) for all lobbies into (2.1) yields the equilibrium utilities:

$$V_i^n = V_i^d + \frac{b_i}{a_i} \frac{\gamma_i}{\gamma + \sum_{j \in L} \gamma_j} \left[W(\mathbf{p}^\circ) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) - G^d - \sum_{j \in L} \frac{a_j}{b_j} V_j^d \right] \quad \text{for } i \in L, \tag{2.14a}$$

$$G^n = G^d + \frac{\gamma}{\gamma + \sum_{j \in L} \gamma_j} \left[W(\mathbf{p}^\circ) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) - G^d - \sum_{j \in L} \frac{a_j}{b_j} V_j^d \right]. \tag{2.14b}$$

The term in square brackets in (2.14) represents the total gains of cooperation. Thus, each lobby's and the government's equilibrium utility are the respective disagreement utilities plus a share of the total gains of cooperation, weighted by their relative bargaining powers. The disagreement utilities are determined by the policy that would be chosen and the contributions that would be paid in that case: $G^d = W(\mathbf{p}^d) + \sum_{i \in L} a_i c_i^d$ and $V_i^d = W_i(\mathbf{p}^d) - b_i c_i^d$ for $i \in L$. Thus, the total gains of cooperation become

$$W(\mathbf{p}^\circ) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) - W(\mathbf{p}^d) - \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^d), \tag{2.15}$$

which is positive by (2.4).[3]

[3] The gains of cooperation are independent of the contribution payments in case of disagreement. This would not be true, however, if disagreement implied the formation of additional lobbies because then (2.15) would become $W(\mathbf{p}^\circ) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^\circ) - W(\mathbf{p}^d) - \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^d) - \sum_{j \notin L} a_j c_j^d \gtreqless 0$.

2.4. The Disagreement Policy in the Nash Bargaining Solution

By (2.12), the equilibrium policy $\mathbf{p}^\circ$ is independent of the disagreement situation. However, we need some assumption about the policy in case of disagreement, $\mathbf{p}^d$, in order to derive the equilibrium utilities and payments. In contrast to the contribution-schedules equilibrium – where we have a policy $\mathbf{p}^{-i}$ without each respective lobby i – bargaining is a collective agreement. Thus, we need to know the policy that the government would choose if the bargaining in total broke down.

This choice depends on two things: Firstly, the bargaining opportunities in case of disagreement and secondly, the government's ability to commit to a disagreement policy before the bargaining starts. Concerning the first point, consider the simplest case in which there is no bargaining after disagreement. Then, no lobby can influence the policy; therefore all disagreement contributions c_i^d are zero. We still have to distinguish two cases, however, depending on the government's ability to announce a disagreement policy ex ante and carry it out ex post. If the government cannot commit to a disagreement policy $\mathbf{p}^d$, it just maximizes welfare ex post:

$$\mathbf{p}^d = \operatorname*{argmax}_{\mathbf{p}} W(\mathbf{p}). \tag{2.16}$$

By contrast, if commitment is possible, the government chooses $\mathbf{p}^d$ so as to maximize its equilibrium utility (2.14b) for $G^d = W(\mathbf{p}^d)$ and $V_i^d = W_i(\mathbf{p}^d)$:

$$\mathbf{p}^d = \operatorname*{argmax}_{\mathbf{p}} \left[W(\mathbf{p}) - \frac{\gamma}{\sum_{j\in L}\gamma_j} \sum_{j\in L} \frac{a_j}{b_j} W_j(\mathbf{p}) \right]. \tag{2.17}$$

(2.16) and (2.17) coincide if $\gamma = 0$; in both cases, equilibrium utility of the government is just disagreement welfare. If $\gamma > 0$ and the government can commit to a disagreement policy, it increases the gains of cooperation and thus its own equilibrium utility by reducing the disagreement profits of the lobbies.

In our static setting, it seems natural to assume that the government is unable to commit to a disagreement policy that does not maximize welfare. However, announcing (2.17) would be credible if it is known that the government would suffer sufficiently high costs of deviating from this announcement ex post; for a more detailed analysis see Appendix A. In any case, the bargaining setting assumes a more active role of the government than the contribution-schedules setting, and this more active role makes the effect of governmental announcements and commitments a natural extension of the analysis.[4]

In contrast to the immediate policy choice after a breakdown implied by (2.16)

[4]See Kaneko and Mao (1996) for a comparison of Nash bargaining with and without commitment to disagreement policies.

or (2.17), disagreement may lead to subsequent bargaining. Naturally, any potential coalition must include the government. In the context of Nash bargaining, such a central role for one player in subsequent coalitions is allowed by the models of Compte and Jehiel (2010), Burguet and Caminal (2016) and Schopf and Voss (2016).[5]

Compte and Jehiel (2010) introduce the *Coalitional Nash Bargaining Solution* (CNBS). In their model, surplus sharing in the grand coalition is determined by a player's position in coalitions that could form if the grand coalition breaks down, and by the respective surpluses. A subsequent coalition is *credible* if each member's equal share in that coalition exceeds the equal share in the grand coalition. For instance, it may hold that in case of disagreement the $|L|$ coalitions containing the government and all lobbies but one are credible. Then, the government receives more than the equal share of the surplus in equilibrium and all lobbies receive less, despite $\gamma_i = \gamma$ for all $i \in L$.

Burguet and Caminal (2016) introduce the *Solution with Consistent Outside OPtions* (SCOOP), which generalizes the CNBS for cases in which the CNBS does not exist. In these cases, the model becomes stochastic: The players assume coalitions to form with probabilities that must be mutually consistent and depend on the surpluses of the potential coalitions. Finally, in Schopf and Voss (2016), we introduce the *Sequential Nash Bargaining Solution*, where we directly exploit the fact that one player – the government – must be part of every coalition, which allows a straightforward derivation of the surplus-splitting based on the government's sequential optimality of the bargaining in case of disagreement, at least for cases with only two lobbies.

3. Discussion

We now compare the contribution-schedules equilibrium and the Nash bargaining solution. From (2.4) and (2.12), the equilibrium policy is identical: $\mathbf{p}^\circ = \mathbf{p}^n$. Thus, the approaches coincide if the contribution payments and, thus, the equilibrium utilities coincide: $V_i^\circ = V_i^n$ and $G^\circ = G^n$. They differ by:

$$\begin{aligned} V_i^\circ - V_i^n &= -b_i \left[C_i^\circ(\mathbf{p}^\circ) - c_i^n \right] \\ &= \frac{1}{\gamma a_i} \Bigg[\gamma a_i \left(V_i^\circ - V_i^d \right) - \gamma_i b_i \left(G^\circ - G^d \right) \\ &\qquad - \frac{\gamma_i b_i}{\gamma + \sum_{j \in L} \gamma_j} \sum_{j \in L} \frac{1}{b_j} \left[\gamma a_j \left(V_j^\circ - V_j^d \right) - \gamma_j b_j \left(G^\circ - G^d \right) \right] \Bigg] \quad \text{for } i \in L, \qquad (3.1a) \end{aligned}$$

[5] See Okada (2010) for an n-person Nash bargaining approach where there is no comparably central player.

$$G^\circ - G^n = \sum_{j \in L} a_j \left[C_i^\circ(\mathbf{p}^\circ) - c_i^n \right]$$
$$= -\frac{1}{\gamma + \sum_{j \in L} \gamma_j} \sum_{j \in L} \frac{1}{b_j} \left[\gamma a_j \left(V_j^\circ - V_j^d \right) - \gamma_j b_j \left(G^\circ - G^d \right) \right], \tag{3.1b}$$

where the first parts of (3.1a) and (3.1b) follow from (2.1) and the second parts follow from substituting (2.1) in (2.14). We characterize these differences in the following Proposition:

Proposition. *The contribution-schedules equilibrium and the Nash bargaining solution coincide if and only if*

$$\gamma a_i \left(V_i^\circ - V_i^d \right) = \gamma_i b_i \left(G^\circ - G^d \right) \qquad \textit{for all } i \in L. \tag{3.2}$$

Else, if the left-hand side exceeds the right-hand side for lobby i, ceteris paribus, its equilibrium utility is greater in the contribution-schedules equilibrium than in the Nash bargaining solution, and vice versa.

Proof. Substituting $V_i^n = V_i^\circ$ and $G^n = G^\circ$ in (3.1) and rearranging yields:

$$\gamma a_i \left(V_i^\circ - V_i^d \right) = \gamma_i b_i \left(G^\circ - G^d \right) + \frac{\gamma_i b_i}{\gamma + \sum_{j \in L} \gamma_j} \sum_{j \in L} \frac{1}{b_j} \left[\gamma a_j \left(V_j^\circ - V_j^d \right) - \gamma_j b_j \left(G^\circ - G^d \right) \right] \quad \text{for all } i \in L, \tag{3.3a}$$

$$0 = \sum_{j \in L} \frac{1}{b_j} \left[\gamma a_j \left(V_j^\circ - V_j^d \right) - \gamma_j b_j \left(G^\circ - G^d \right) \right]. \tag{3.3b}$$

Substituting (3.3b) in (3.3a) yields (3.2). The remainder of the Proposition follows from substituting (3.2) in (3.1a) for $j \in L \backslash i$:

$$V_i^\circ - V_i^n = \frac{1}{\gamma a_i} \frac{\gamma + \sum_{i \in L \backslash j} \gamma_j}{\gamma + \sum_{j \in L} \gamma_j} \left[\gamma a_i \left(V_i^\circ - V_i^d \right) - \gamma_i b_i \left(G^\circ - G^d \right) \right]. \tag{3.4}$$
□

The Proposition can immediately be applied to a special case. The contribution-schedules equilibrium and the Nash bargaining solution coincide if the following conditions are all fulfilled: There is only one lobby ($|L| = 1$), the government has no bargaining power ($\gamma = 0$), and the disagreement policy is defined by (2.16) or (2.17) (which coincide for $\gamma = 0$). With $\gamma = 0$, the left-hand side of (3.2) equals zero. By (2.16), G^d then is maximized welfare. With only one lobby, (2.8b) implies $G^\circ = W(\mathbf{p}^{-i})$, by (2.5), $\mathbf{p}^{-i}$ is welfare-maximizing as well. Thus, $G^\circ = G^d$.

The proposition formalizes cases in which the two models of lobby influence coincide not only with respect to their allocative, but also their distributive consequences, and shows that these cases are relatively special; they depend on assumptions about disagreement behavior in the Nash-bargaining model. We can illustrate a comparison for another natural case. Suppose that disagreement in the Nash-bargaining setting would lead to welfare maximization. Additionally, assume that the government's utilitarian welfare function is the sum of sectoral welfare levels. Finally, assume that all sectors are organized *and* that a_i/b_i is constant across sectors (equivalent to Grossman and Helpman (1994)). In both models, equilibrium policy would then be welfare-maximizing. However, (3.1a) and (3.1b) become:

$$V_i^\circ - V_i^n = -\frac{b_i}{a_i}\left[W(\mathbf{p}^{-i}) + \sum_{j\in L\setminus i}\frac{a_j}{b_j}W_j(\mathbf{p}^{-i}) - W(\mathbf{p}^\circ) - \sum_{j\in L\setminus i}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ)\right] < 0 \quad \text{for } i \in L, \tag{3.5a}$$

$$G^\circ - G^n = \sum_{i\in L}\left[W(\mathbf{p}^{-i}) + \sum_{j\in L\setminus i}\frac{a_j}{b_j}W_j(\mathbf{p}^{-i}) - W(\mathbf{p}^\circ) - \sum_{j\in L\setminus i}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ)\right] > 0, \tag{3.5b}$$

In the contribution-schedules equilibrium, the government is paid for implementing the welfare-maximizing policy. Each lobby is willing to pay because it is better off in equilibrium than it would be if the weighted sum of welfare and all other sectors' profits would be maximized. The opposite is true in the Nash-bargaining model: Nobody pays anything, because the government will implement the welfare-maximizing policy either way. Because equilibrium policy and disagreement policy coincide, this is independent of the bargaining-power parameters.

The two cases discussed above demonstrate that the government can be better off in either approach, depending on the assumptions about bargaining power and the disagreement policy in the Nash bargaining solution. If the disagreement policy is close to the equilibrium policy, the government's bargaining position is weak. In the contribution-schedules equilibrium, the government does not bargain with the lobbies. However, there is competition for influence. A lobby has a weak position and a high willingness to pay in order to influence policy if its gross utility increases strongly due to its influence.

Taking the set of lobbies as given, we have established that payments and thus equilibrium utilities depend on the process of lobby influence. However, forming a lobby may be costly for groups of economic agents with the same policy preferences. In this case, the set of lobbies will be endogenous, and depend on the lobbies' gains of lobby activities, net of contribution payments. By influencing lobby formation, payments thus influence equilibrium policy and the economy's allocation.[6] We formally illustrate this point in Appendix B, and show that if lobby formation is endogenous, even more re-

[6] Arguably, different valuations of payments – i.e., different a_i, b_i – imply that even the distributive effects of the political equilibria have implications for economic efficiency. See Appendix C.

strictive assumptions are necessary to make the models equivalent. Additionally, a high equilibrium utility of a sector means that there is an incentive to enter this sector if possible, which also influences the economy's allocation.[7]

Finally, note that our Proposition compares the equilibrium utilities for a given set of available policies. However, the way that equilibrium policies are determined suggests that the lobbies would also care about the policy instruments available to the government. Grossman and Helpman (1994) suggest that a lobby would possibly prefer to restrict policy choice to inefficient instruments, because this may increase the difference between equilibrium utilities and the utilities in case the respective lobby does not take part, which reduces its equilibrium contributions, see (2.8a). In the Nash-bargaining model, the reasoning is similar, but the lobby would prefer to restrict policy choice so as to maximize (2.14a). Even if the equilibrium utilities coincide for a given set of available policies, the preferred policy instruments may not. Thus, a clearer understanding of the appropriate model of policy setting is also crucial for understanding the constitutional choice of allowed policy instruments.

Acknowledgements

We would like to thank Manuel Förster, Anke Gerber, B. Michael Gilroy, Igor Legkiy and Nathalie Schopf for helpful comments. Achim Voss gratefully acknowledges the hospitality of the Economics Department of the University of Copenhagen and the financial support by the Fritz Thyssen Foundation (grant no. Az. 50.14.0.040).

Appendix A. Reputation Cost

In this appendix, we analyze an example of a setting in which a policy different from (2.16) is anticipated in case of disagreement. Suppose that the government can move first by publicly – and unconditionally – announcing a policy $\mathbf{p}^A$ it plans to carry out. Afterwards, it meets the lobbies for bargaining. Finally, payments and the actual policy choice take place. If the government has announced a policy but implements another policy on the final stage ($\mathbf{p} \neq \mathbf{p}^A$), it suffers a cost K representing a reputation loss.

We can analyze the effects of different amounts of K by solving backwards. Thus, let us first derive the disagreement policy. If the bargaining has broken down, there are only two policies that the government could sensibly choose. It either chooses the policy it has announced (if it has announced a policy at all), or it maximizes welfare as described by (2.16); in the following, we will refer to this latter policy as $\mathbf{p}^W$. A policy

[7] Additionally, free entry may lead to a breakdown of the sector's lobby, for example if it cannot prevent free riding of the entrants. See Grossman and Helpman (1996) and Baldwin and Robert-Nicoud (2007).

announcement is only *credible* as a disagreement policy if

$$K \geq W(\mathbf{p}^W) - W(\mathbf{p}^A). \tag{A.1}$$

Otherwise, $\mathbf{p}^d = \mathbf{p}^W$ is always anticipated.

Now, we determine the government's equilibrium utility G^n if $\mathbf{p}^d = \mathbf{p}^A$. Note that choosing the equilibrium policy in general implies deviating from the announcement; otherwise, the government could just as well forbear to announce a policy. Taking the reputation cost K and the disagreement utilities $G^d = W(\mathbf{p}^A)$ and $V_i^d = W_i(\mathbf{p}^A)$ into account in the Nash product (2.9a), we can determine G^n along the lines of Section 2.3:

$$G^n = W(\mathbf{p}^A) + \frac{\gamma}{\gamma + \sum_{j\in L}\gamma_j}\left[W(\mathbf{p}^\circ) + \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ) - W(\mathbf{p}^A) - \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^A) - K\right]. \tag{A.2}$$

Therefore, the government maximizes (A.2) with respect to $\mathbf{p}^A$ subject to the credibility constraint (A.1). This yields the policy vector described by (2.17) if the reputation cost is high enough such that (A.1) is not binding.

Alternatively, the government could choose not to announce a policy, so that there is no reputation cost and $\mathbf{p}^d = \mathbf{p}^W$ is anticipated. Then, the government's equilibrium utility would be (2.14b) for $G^d = W(\mathbf{p}^W)$ and $V_i^d = W_i(\mathbf{p}^W)$. A policy announcement is only *rational* if it enhances the government's equilibrium utility, for which

$$\begin{aligned}
& W(\mathbf{p}^A) + \frac{\gamma}{\gamma + \sum_{j\in L}\gamma_j}\left[W(\mathbf{p}^\circ) + \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ) - W(\mathbf{p}^A) - \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^A) - K\right] \\
& \geq W(\mathbf{p}^W) + \frac{\gamma}{\gamma + \sum_{j\in L}\gamma_j}\left[W(\mathbf{p}^\circ) + \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ) - W(\mathbf{p}^W) - \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^W)\right] \\
\Leftrightarrow \quad & K \leq \sum_{j\in L}\frac{a_j}{b_j}\left[W_j(\mathbf{p}^W) - W_j(\mathbf{p}^A)\right] - \sum_{j\in L}\frac{\gamma_j}{\gamma}\left[W(\mathbf{p}^W) - W(\mathbf{p}^A)\right] \qquad \text{(A.3)}
\end{aligned}$$

has to be fulfilled, where $\mathbf{p}^A$ is the policy maximizing (A.2) subject to (A.1). The inequality in (A.3) requires $\sum_{j\in L}\frac{a_j}{b_j}\left[W_j(\mathbf{p}^W) - W_j(\mathbf{p}^A)\right] > 0$; it is fulfilled for the policy vector described by (2.17).

Thus, the announcement must be credible and rational to influence payments. As we can see in (A.3), the latter requirement is more likely to be fulfilled if there are more lobbies for which the disagreement utilities decline by choosing $\mathbf{p}^A$ instead of $\mathbf{p}^W$, if these lobbies have lower marginal payment costs b_j and the respective valuation parameters a_j are higher. The opposite holds for lobbies for which the disagreement utilities increase by choosing $\mathbf{p}^A$ instead of $\mathbf{p}^W$. Furthermore, a higher relative bargaining power of the government increases the right-hand side of (A.3). Finally, the less welfare declines by choosing $\mathbf{p}^A$ instead of $\mathbf{p}^W$, the more likely (A.1) and (A.3) hold. All these factors imply that the government has a greater (monetary) gain from manipulating the disagreement utilities, relative to the reputation loss K.

Appendix B. Endogenous Lobbies

The equilibrium policies (2.4) and (2.12) coincide only if the number and the composition of lobbies are the same in equilibrium. Let us now take into account that special-interest groups or, for brevity, *sectors*, can be politically organized or unorganized. In the former case, we call a sector (or its organization) a *lobby*. If the decisions whether to form a lobby differ between the equilibria of the two models, then equilibrium policies will differ as well. We illustrate this point using the model of Mitra (1999), who has analyzed endogenous lobby formation for the contribution-schedules model.

By (2.8a), sector i would have a benefit $V_i^\circ - W_i(\mathbf{p}^{-i})$ from having a lobby in the contribution-schedules model, while that benefit in the Nash bargaining solution would be $V_i^n - V_i^d$, as we can see in (2.14a). To form a lobby, however, each group has to exert a sector-specific fixed cost F_i, such that the net benefits of lobby formation are $V_i^\circ - W_i(\mathbf{p}^{-i}) - F_i$ and $V_i^n - V_i^d - F_i$, respectively. Suppose that the sectors simultaneously decide whether to form a lobby before the policy vector and contributions are determined. If we can rank the sectors in descending order of their net benefits for each possible subset $L \subseteq M$, if this ranking is independent of the composition of L and if the net benefits decline with the number of lobbies, then there exists a unique Nash equilibrium of lobby formation in each approach. In this appendix, we derive conditions under which the equilibria in both approaches coincide.

Consider the contribution-schedules model first. Suppose we have an equilibrium with $L \subseteq M$ lobbies. The net benefit for lobby i exceeds that of lobby h if and only if

$$\begin{aligned} &\frac{b_i}{a_i}\left[W(\mathbf{p}^\circ) + \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ) - W(\mathbf{p}^{-i}) - \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^{-i})\right] - F_i \\ &> \frac{b_h}{a_h}\left[W(\mathbf{p}^\circ) + \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^\circ) - W(\mathbf{p}^{-h}) - \sum_{j\in L}\frac{a_j}{b_j}W_j(\mathbf{p}^{-h})\right] - F_h. \end{aligned} \tag{B.1}$$

This depends on the costs of paying contributions and their valuations by the government, on the respective lobby's gain of offering a contribution schedule and on the respective fixed cost. To simplify, assume that the groups are symmetric, i.e., $a_i/b_i = a/b$

for each $i \in M$ and

$$W(\mathbf{p}^{-i}) + \sum_{j \in L} \frac{a_i}{b_i} W_j(\mathbf{p}^{-i}) = W(\mathbf{p}^{-h}) + \sum_{j \in L} \frac{a_h}{b_h} W_j(\mathbf{p}^{-h}) \tag{B.2}$$

for each $i, h \in M$.[8] Then, the groups can be ranked and indexed in ascending order of their fixed costs:

$$F_1 < F_2 ... < F_{|L|} ... < F_{|M|-1} < F_{|M|}. \tag{B.3}$$

This ranking tells us in which order the sectors form lobbies; for instance, if sector 2 has a lobby in equilibrium, then sector 1 will have a lobby as well. We can denote the sector with the highest fixed cost of those that are organized by l $(\equiv |L|)$. Conversely, the number of lobbies l then defines their composition, such that the policy vector, the fixed costs and the net benefits can be written as functions of l. Then, an interior Nash equilibrium is defined by

$$\begin{aligned} &\frac{b}{a}\left[W(\mathbf{p}^{l^\circ}) + \sum_{j=1}^{l^\circ} \frac{a}{b} W_j(\mathbf{p}^{l^\circ}) - W(\mathbf{p}^{l^\circ-1}) - \sum_{j=1}^{l^\circ-1} \frac{a}{b} W_j(\mathbf{p}^{l^\circ-1})\right] \geq F_{l^\circ} \quad \text{and} \\ &\frac{b}{a}\left[W(\mathbf{p}^{l^\circ+1}) + \sum_{j=1}^{l^\circ+1} \frac{a}{b} W_j(\mathbf{p}^{l^\circ+1}) - W(\mathbf{p}^{l^\circ}) - \sum_{j=1}^{l^\circ} \frac{a}{b} W_j(\mathbf{p}^{l^\circ})\right] < F_{l^\circ+1}, \end{aligned} \tag{B.4}$$

where l° is the equilibrium number of lobbies. Moreover, assume that $W(\mathbf{p}^l) + \sum_{j=1}^{l} \frac{a}{b} W_j(\mathbf{p}^l)$ is weakly concave in l. Then,

$$\begin{aligned} &\frac{b}{a}\left[W(\mathbf{p}^{l}) + \sum_{j=1}^{l} \frac{a}{b} W_j(\mathbf{p}^{l}) - W(\mathbf{p}^{l-1}) - \sum_{j=1}^{l-1} \frac{a}{b} W_j(\mathbf{p}^{l-1})\right] - F_l \\ &> \frac{b}{a}\left[W(\mathbf{p}^{l+1}) + \sum_{j=1}^{l+1} \frac{a}{b} W_j(\mathbf{p}^{l+1}) - W(\mathbf{p}^{l}) - \sum_{j=1}^{l} \frac{a}{b} W_j(\mathbf{p}^{l})\right] - F_{l+1} \end{aligned} \tag{B.5}$$

always holds, which guarantees that the Nash equilibrium is unique.

Now consider the Nash bargaining solution with $L \subseteq M$ lobbies. The net benefit for lobby i exceeds that of lobby h if and only if

$$\begin{aligned} &\frac{b_i \gamma_i}{a_i}\left[W(\mathbf{p}^n) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^n) - G^d(L) - \sum_{j \in L} \frac{a_j}{b_j} V_j^d(L)\right] - F_i \\ &> \frac{b_h \gamma_h}{a_h}\left[W(\mathbf{p}^n) + \sum_{j \in L} \frac{a_j}{b_j} W_j(\mathbf{p}^n) - G^d(L) - \sum_{j \in L} \frac{a_j}{b_j} V_j^d(L)\right] - F_h. \end{aligned} \tag{B.6}$$

[8] Mitra (1999) provides a sectoral model that guarantees that this condition is fulfilled.

This depends on the same factors as (B.1), except that the bargaining powers are additionally relevant, and the gains of cooperation are homogenous between the lobbies (while in the contribution-schedules model, each lobby could in general have a different gain of offering a contribution schedule).[9] Comparing (B.1) and (B.6), it is obvious that the ranking is in general not the same. Furthermore, the groups being symmetric is neither necessary nor sufficient for an unambiguous ranking in the Nash bargaining solution. However, if the groups are symmetric *and* the bargaining powers of the lobbies are homogenous, i.e., $\gamma_i = \gamma_M$ for each $i \in M$, the groups can be ranked according to (B.3). Along the lines of (B.4), an interior Nash equilibrium is then defined by

$$\frac{b}{a}\frac{\gamma_M}{\gamma + l^n\gamma_M}\left[W(\mathbf{p}^{l^n}) + \sum_{j=1}^{l^n}\frac{a}{b}W_j(\mathbf{p}^{l^n}) - G^d(l^n) - \sum_{j=1}^{l^n}\frac{a}{b}V_j^d(l^n)\right] \geq F_{l^n} \quad \text{and}$$
$$\frac{b}{a}\frac{\gamma_M}{\gamma + (l^n+1)\gamma_M}\left[W(\mathbf{p}^{l^n+1}) + \sum_{j=1}^{l^n+1}\frac{a}{b}W_j(\mathbf{p}^{l^n+1}) - G^d(l^n+1) - \sum_{j=1}^{l^n+1}\frac{a}{b}V_j^d(l^n+1)\right] < F_{l^n+1}, \tag{B.7}$$

where l^n is the equilibrium number of lobbies. Moreover, assume that the total gains of cooperation decline with the number of lobbies. Then,

$$\begin{aligned}&\frac{b}{a}\frac{\gamma_M}{\gamma + l\gamma_M}\left[W(\mathbf{p}^{l}) + \sum_{j=1}^{l}\frac{a}{b}W_j(\mathbf{p}^{l}) - G^d(l) - \sum_{j=1}^{l}\frac{a}{b}V_j^d(l)\right] - F_l \\ &> \frac{b}{a}\frac{\gamma_M}{\gamma + l\gamma_M}\left[W(\mathbf{p}^{l+1}) + \sum_{j=1}^{l+1}\frac{a}{b}W_j(\mathbf{p}^{l+1}) - G^d(l+1) - \sum_{j=1}^{l+1}\frac{a}{b}V_j^d(l+1)\right] - F_{l+1},\end{aligned} \tag{B.8}$$

always holds, which guarantees that the Nash equilibrium is unique. Thus, even if the groups are symmetric *and* the bargaining powers of the lobbies are homogenous, such that the rankings in both models coincide, the sufficient conditions for a unique Nash equilibrium differ, because condition (B.8) depends on the disagreement policy discussed in Section 2.4.

If the groups are symmetric, the bargaining powers of the lobbies are homogenous, if (B.5) and (B.8) hold, and if the equilibria are interior, the equilibrium number of lobbies coincides in both approaches if and only if $F_{l^\circ} = F_{l^n}$. Comparing (B.4) and (B.7), it is obvious that even under all these restrictive assumptions the equilibrium number of lobbies will in general not be the same. We conclude that the way in which lobby influence takes place (i.e., whether the contribution-schedules model or the Nash-bargaining model is the appropriate model of lobby influence) determines the

[9] With homogeneous fixed costs of lobby formation, the groups can easily be ranked and indexed in descending order of $b_i\gamma_i/a_i$. This would not be the case in the contribution-schedules model due to the heterogeneous gains of cooperation.

equilibrium composition of organized lobbies and, thus, the equilibrium policy and the economy's allocation.

Appendix C. Total Efficiency

Lobbying is inefficient for two reasons. Firstly, the equilibrium policy does, in general, not maximize welfare. Secondly, paying and receiving contributions causes social costs if $b_i > a_i$.[10] The equilibrium policy is the same in both approaches. However, comparing the social costs of paying and receiving contributions, we have

$$\sum_{i\in L}(b_i-a_i)\left[C_i^\circ(\mathbf{p}^\circ)-c_i^n\right]=-\sum_{i\in L}\frac{b_i-a_i}{\gamma a_i b_i}\Bigg[\gamma a_i\left(V_i^\circ-V_i^d\right)-\gamma_i b_i\left(G^\circ-G^d\right) \\ -\frac{\gamma_i b_i}{\gamma+\sum\limits_{j\in L}\gamma_j}\sum_{j\in L}\frac{1}{b_j}\left[\gamma a_j\left(V_j^\circ-V_j^d\right)-\gamma_j b_j\left(G^\circ-G^d\right)\right]\Bigg] \tag{C.1}$$

by (3.1). As a special case, assume that (3.2) is fulfilled for $j\in L\backslash i$:

$$\sum_{i\in L}(b_i-a_i)\left[C_i^\circ(\mathbf{p}^\circ)-c_i^n\right]=\left[\frac{\sum\limits_{j\in L}\gamma_j\frac{b_j-a_j}{\gamma a_j}}{\gamma+\sum\limits_{j\in L}\gamma_j}-\frac{b_i-a_i}{\gamma a_i}\right]\cdot\frac{1}{b_i}\left[\gamma a_i\left(V_i^\circ-V_i^d\right)-\gamma_i b_i\left(G^\circ-G^d\right)\right]. \tag{C.2}$$

Thus, given that (3.2) is fulfilled for $j\in L\backslash i$ and $\frac{b_i-a_i}{a_i}\geq\frac{b_j-a_j}{a_j}$ for $j\in L\backslash i$, the contribution-schedules equilibrium is more efficient than the Nash bargaining solution if the left-hand side of (3.2) exceeds its right-hand side for lobby i, and vice versa. On the one hand, lobby i then pays less in the contribution-schedules equilibrium than in the Nash bargaining solution. On the other hand, G° declines so that the other lobbies must pay more to ensure that (3.2) remains fulfilled for them. However, as long as $\frac{b_i-a_i}{a_i}\geq\frac{b_j-a_j}{a_j}$ for $j\in L\backslash i$, total efficiency increases because total payments decline.

References

Aidt, T.S., 1998. Political internalization of economic externalities and environmental policy. Journal of Public Economics 69, 1–16.

Baldwin, R.E., Robert-Nicoud, F., 2007. Entry and asymmetric lobbying: why governments pick losers. Journal of the European Economic Association 5, 1064–1093.

[10] If lobbying provides information to the government that improves policy, it can also enhance welfare, see, e.g., Ball (1995) and Lagerlöf (1997). This can even be the case if policy is identical with and without lobbying, see, e.g., Bhagwati (1980).

Ball, R., 1995. Interest groups, influence and welfare. Economics and Politics 7, 119–146.

Bergemann, D., Välimäki, J., 2003. Dynamic common agency. Journal of Economic Theory 111, 23–48.

Bhagwati, J.N., 1980. Lobbying and welfare. Journal of Public Economics 14, 355–363.

Binmore, K., 2011. Natural Justice. Oxford University Press, New York City.

Binmore, K., 2014. Bargaining and fairness. PNAS 111, 10785–10788.

Burguet, R., Caminal, R., 2016. Coalitional bargaining with consistent counterfactuals. Working Paper 923. Barcelona Graduate School of Economics.

Compte, O., Jehiel, P., 2010. The coalitional Nash bargaining solution. Econometrica 78, 1593–1623.

Datt, D., Mehra, M.K., 2016. Environmental policy in a federation with special interest politics and inter-governmental grants. Environmental and Resource Economics 64, 575–595.

Dharmapala, D., 1999. Comparing tax expenditures and direct subsidies: the role of legislative committee structure. Journal of Public Economics 72, 421–454.

Fredriksson, P.G., List, J.A., Millimet, D.L., 2003. Bureaucratic corruption, environmental policy and inbound US FDI: theory and evidence. Journal of Public Economics 87, 1407–1430.

Fredriksson, P.G., Svensson, J., 2003. Political instability, corruption and policy formation: the case of environmental policy. Journal of Public Economics 87, 1383–1405.

Gawande, K., Bandyopadhyay, U., 2000. Is protection for sale? Evidence on the Grossman-Helpman theory of endogenous protection. Review of Economics and Statistics 82, 139–152.

Gawande, K., Krishna, P., Olarreaga, M., 2009. What governments maximize and why: the view from trade. International Organization 63, 491–532.

Goldberg, P.K., Maggi, G., 1999. Protection for sale: an empirical investigation. The American Economic Review 89, 1135–1155.

Grossman, G.M., Helpman, E., 1994. Protection for sale. The American Economic Review 84, 833–850.

Grossman, G.M., Helpman, E., 1996. Rent dissipation, free riding, and trade policy.

European Economic Review 40, 795–803.

Grossman, G.M., Helpman, E., 2001. Special Interest Politics. The MIT Press, Cambridge, Massachusetts.

Kaneko, M., Mao, W., 1996. N-person nash bargaining with variable threats. Japanese Economic Review 47, 235–250.

Kee, H.L., Olarreaga, M., Silva, P., 2007. Market access for sale. Journal of Development Economics 82, 79–94.

Lagerlöf, J., 1997. Lobbying, information, and private and social welfare. European Journal of Political Economy 13, 615–637.

Maggi, G., Rodríguez-Clare, A., 2000. Import penetration and the politics of trade protection. Journal of International Economics 51, 287–304.

Martimort, D., Semenov, A., 2007. Political biases in lobbying under asymmetric information. Journal of the European Economic Association 5, 614–623.

McCalman, P., 2004. Protection for sale and trade liberalization: an empirical investigation. Review of International Economics 12, 81–94.

Mitra, D., 1999. Endogenous lobby formation and endogenous protection: a long-run model of trade policy determination. The American Economic Review 89, 1116–1134.

Mitra, D., Thomakos, D.D., Ulubaşoğlu, M.A., 2002. "Protection for sale" in a developing country: democracy vs. dictatorship. Review of Economics and Statistics 84, 497–508.

Mitra, D., Thomakos, D.D., Ulubaşoğlu, M.A., 2006. Can we obtain realistic parameter estimates for the "protection for sale" model? Canadian Journal of Economics 39, 187–210.

Okada, A., 2010. The Nash bargaining solution in general n-person cooperative games. Journal of Economic Theory 145, 2356–2379.

Schleich, J., 1999. Environmental quality with endogenous domestic and trade policies. European Journal of Political Economy 15, 53–71.

Schopf, M., Voss, A., 2016. Bargaining over natural resources: governments between environmental organizations and extraction firms. Mimeo.

Slinko, I., Yakovlev, E., Zhuravskaya, E., 2005. Laws for sale: evidence from Russia. American Law and Economics Review 7, 284–318.