

GIL S. EPSTEIN
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Endogenous Public Policy and Contests



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To Ayelet, my mother Laura
and my precious children Ofir, Noga, Inbal and Eitan.

G.S.E.

To Dorrit.

S.N.

Preface

This book sets out to analyze the question of endogenous policy determination, taking into account basic economic and political considerations that are relevant in a variety of institutional and political environments, in liberal democracies as well as nondemocratic political environments. Focusing on the role of interest groups and their lobbying and rent-seeking efforts in the determination of public policy, we apply strategic contest theory as our basic methodology and clarify the fundamental parameters that determine the behavior of the government (the ruling politician and/or the bureaucrats/civil servants) and of the interest groups – the contestants for the prizes associated with public policy. Our analysis focuses on the relationship between these fundamental parameters (the objective of the government, political culture, the contest success function, the stakes of the interest groups and their characteristics – lobbying power, preferences) and public policy, the contest-winning probabilities of the interest groups and their efforts – the resources they expend. We provide comprehensive illustrations of the usefulness of the proposed approach in five specific cases: the determination of monopoly price, privatization policy, migration quotas, minimum wage and promotion in tournaments.

The book has two alternative functions. It can be used as a text for a course on endogenous public policy for advanced undergraduate or graduate students. It can also be used (partly or as a whole) as part of an advanced undergraduate or graduate course in public economics, political economy or public choice.

The book consists of an introductory chapter and five parts containing 15 chapters. The introduction provides a brief overview of the literature on public-policy determination, clarifies the distinctive characteristics of our proposed approach and its advantages and disadvantages.

Part A, *The Basic Contest*, introduces the basic contest that we apply and rationalizes its existence. This part has two chapters. Chapter II, *The Policy Contest*, describes the basic policy contest and derives its equilibrium under the two most commonly assumed contest success functions that specify the winning probabilities of the contestants, corresponding to their efforts (rent seeking or lobbying expenditures). Chapter III, *Contest Rationalization – Mi-*

crofoundations, provides a microfoundation for the public-policy contest. Our rationalization hinges on the existence of government (politicians') preferences that take into account the lobbying outlays of the interest groups, in addition to public well being.

Part B, *The Extended Contest: With Government*, introduces our first model of endogenous public policy, where the government determines the proposed public policy and the contest success function (CSF) is of the simple lottery (logit) type proposed by Tullock (1980). By this most popular CSF, a contestant's winning probability is equal to the ratio between his own effort and the total efforts made by the contestants in attempting to win the prize implied by the proposed public policy. The effect of political culture on the proposed public policy, the contestants' efforts and their welfare is then examined. We also study the effect of political culture on relative rent dissipation and on the nature of the proposed policy (is it compromise enhancing, relative to the policy supported by the interest groups), assuming alternative and more general CSFs. Part B has three chapters. Chapter IV, *Endogenous Public Policy*, presents the extended game that has two stages. In the first stage, a bureaucrat proposes a policy. In the second stage, the other two players, the interest groups, compete for, or against, approval of the proposed policy by the elected politician. The second-stage subgame is the standard rent-seeking rent-avoidance contest presented in Part A. In this contest, the interest groups compete for benefits associated with the approval or rejection of the proposed policy, expending resources that are (partly) received by the ruling politician. The politician and the bureaucrat are not necessarily extreme rent seekers. Depending on the political culture, they may also care about the enhancement of the aggregate welfare of the interest groups. The bureaucrat's objective function hinges on a single parameter: the weight assigned to social welfare relative to the total rent-seeking or lobbying outlays. This parameter represents the political culture or the degree of politicization of the government. Our analysis in this chapter focuses on the effect of changes in the degree of politicization on the proposed public policy and, in turn, on the lobbying efforts by the interest groups and their expected welfare. In Chapter V, *Culture, Politicization and Relative Rent Dissipation*, we focus on clarifying the relationship between political culture and relative rent dissipation; the ratio between the total rent-seeking outlay and the expected prize in equilibrium. Chapter VI, *Lobbying and Compromise*, is concerned with the possibility of lobbying that is not compromise enhancing. Specifically, the objective of this chapter is to specify sufficient conditions for lobbying that gives rise to a proposed policy that is more extreme than the proposals preferred by the interest groups taking part in the extended contest.

Part C, *The Policy Effect*, investigates a general class of two-player public-policy contests and examines the effect of a change in the proposed policy that may affect the payoffs of one or both of the contestants, on their effort and performance. In particular, we focus on the role of three types of asymmetry between the contestants on their effort and performance. This part has

three chapters. Chapter VII, *Effort and Performance*, presents a comprehensive comparative-statics analysis of the public-policy contest. In particular, it is concerned with the clarification of the role of three types of asymmetry between contestants on the sensitivity of their effort and their performance to the proposed public policy. Chapter VIII, *Prizes (Size and Distribution) and Efforts*, further clarifies the effect of changes in public policy that determine the prize system on the total effort invested by the contestants. In particular, we clarify why more restrained government intervention that directly reduces the prizes of the two contestants may have the “perverse” effect of increasing their total exerted efforts. Chapter IX, *Asymmetry and Corrective Public Policy*, is concerned with the conditions that ensure the existence of an effective corrective tax-transfer policy that complements an existing inefficient public-policy proposal. Effectiveness of corrective policy means, first, that it secures an efficient contest outcome. Secondly, that given the existing inefficient policy proposal, it is optimal from the viewpoint of both interest groups.

Part D, *The Extended Contest: Without Government*, introduces our second model of endogenous public policy, where the government does not determine the proposed public policy. Rather, the two competing policies are determined by the interest groups. This part has two chapters. Chapter X, *The Social Cost of Rent Seeking when Consumer Opposition Influences Monopoly Behavior*, presents a simple version of the extended contest where the policy is determined endogenously, not by the government, but by one of the contestants. To clarify the relationship between this model and the existing literature and to illustrate its significance, we present the model applying a monopoly–consumer context. Chapter XI, *Strategic Restraint*, presents the second general extended contest where public-policy proposals are determined by the two interest groups. The objective of this chapter is to establish that competition over endogenously determined policies reduces polarization and, in turn, wasteful lobbying activities.

The last part E, *Applications*, presents five illustrations of the usefulness of the extended contests presented in Parts B and D. These applications are presented in Chapters XII, XIII, XIV, XV and XVI that deal, respectively, with *Monopoly Price Determination*, *Privatization*, *Migration Policy*, *Minimum Wage* and *Tournaments*.

The book is based on joint research that has been presented in papers that appeared in print since 2002; see Epstein and Nitzan (2002a), (2002b), (2002c), (2003a), (2003b), (2004), (2005), (2006a), (2006b), (2006c), (2006d), (2006e) and Druk-Gal, Epstein and Nitzan (2004). We are grateful to the publishers of these works for permission to republish all or part of the material they contain. We are also grateful to Ira Gang, Mark Gradstein, Nava Kahana, Martin Kolmar, Kai Konrad, Ed Lazear and Wolfgang Leininger, who made useful suggestions for improvement in various parts of this work. Part of our joint research was completed while visiting CESifo and IZA. We are

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September, 2007

Gil S. Epstein
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Notation

- $\Pr_i$ – The probability of approval of player i 's preferred policy;
 u_i – The present discounted value for player i if his preferred policy is approved;
 v_i – The present discounted value for player i if the preferred policy of player j is approved;
 $n = (u_i - v_i)$ – The stake of player i (his real benefit from winning the contest): $u_i > v_i$;

Indices:

1. LB or L – low-benefit (LB) player;
2. HB or H – high-benefit (HB) player;
3. s – status quo
4. d – defender of the status quo;
5. a – challenger of the status quo;
6. c – consumers;
7. f – firm

- x_i – The effort of the risk-neutral player i – rent-seeking outlays;
 I – The policy variable;
CSF – contest success function;

Types of contest success functions:

1. $\Pr_i = \frac{x_i}{x_j + x_i}$ for $i, j = 1, 2$ and $i \neq j$ – Tullock (1980) contest success function;
2. $\Pr_i = \frac{dx_i^r}{dx_j^r + x_i^r}$ for $r \leq 2$ and $d > 0$ – The logit, generalized lottery, CSF;
3. $\Pr_i = \begin{cases} 1 & \text{if } x_i > x_j \\ 0.5 & \text{if } x_i = x_j \\ 0 & \text{if } x_j > x_i \end{cases}$ – The all-pay auction;
4. $\Pr_i(x_i, x_j)$ – General CSF;

$X = \text{RD}$ – Total expenditure of the contestants – the *rent dissipation* (RD) of the contest; Rent-seeking outlays;

$\text{RRD} = \frac{X}{\sum_i \text{Pr}_i n_i(I)}$ – *relative rent dissipation* (RRD), total expenditure of the contestants relative to the total expected payoffs (expected prize);

“*” – Indicates the value in equilibrium.

Two possible types of expected payoff (expected prize) of interest group i :

- (i) $\bar{E}(w_i) = v_i(I) + \text{Pr}_i n_i(I)$
- (ii) $\bar{E}(u_i) = \text{Pr}_i n_i(I)$

Two possible types of expected net payoff of interest group i :

- (i) $E(w_i) = v_i(I) + \text{Pr}_i n_i(I) - x_i = \bar{E}(w_i^*) - x_i^*$
- (ii) $E(u_i) = \text{Pr}_i n_i(I) - x_i = \bar{E}(u_i^*) - x$;

$G(\cdot)$ – Government’s/bureaucrat’s/regulator’s objective function;

α – The weight (commitment) assigned to social welfare.

Introduction

The significance of a positive economic theory of public-policy determination for public economics has stimulated several attempts to provide such a theory. A comprehensive survey of these attempts appears in Persson and Tabellini (2000). These endeavors were based on different approaches that had to face the challenge of taking into account economic as well as political factors. Regardless of the institutional and political setting, such factors seem to be essential to the plausibility of such a theory.

The interaction between citizens and politicians takes two main forms: interaction through voting in elections and interaction through lobbying of interest groups. This book focuses on one particular form of the latter interaction, disregarding the former. The role of electoral political competition in the determination of public policy is thus ignored.

The behavior of politicians in their interaction with interest groups can be inspired by two main motives. The politicians may be purely self-interested or opportunistic, caring only about the rents they receive. An alternative extreme possibility is that the politicians are partisan, caring only about the well being of interest groups or of society. This book allows both extreme motivations as well as mixes of the two. Any such mix is assumed to represent the prevailing political culture in the political economic environment.

The role of “interest-group politics” in the endogenous determination of public policy has been examined, notably in the context of international-trade policy. Some workers have proposed a stylized nonstrategic political economic approach that is based on the assumption that the government maximizes some given political support function that may attach different weights to the interest groups affected by the trade policy; see Hillman (1989, and references therein), Long and Vousden (1991), Mayer (1984) and Rodrik (1986). Peltzman’s (1976) earlier model proposes political-support maximizing regulation, where the regulator trades off the interests of producers and consumers. Magee, Brock and Young (1989) study a nonstrategic general-equilibrium framework in which trade policy is set by an elected politician. In

this setting, the interest groups make contributions that affect the probability that their preferred candidates are elected.

In a strategic setting, Appelbaum and Katz (1986) examine the endogenous determination of wage regulation in a game where the government is an active leading player who seeks rents by setting rents. More recently, Grossman and Helpman (1994) and Rama (1997), applying the common-agency model pioneered by Bernheim and Whinston (1986), view trade policy as the equilibrium outcome of a strategic game in which the interest groups affected by the trade policy act as principals, taking into account the influence of their contribution schemes on the agent who sets trade policy (the government).

Since lobbying is an important part of the policy-making process in representative democracies, several studies, such as Grossman and Helpman (2001) and Persson and Tabellini (2000) have addressed the issue of to what extent lobbying affects policy. Modeling lobbying as a “menu-auction,” Grossman and Helpman (1996) study a Downsian model of electoral competition where candidates choose policies to maximize their probability of winning the elections. Building on the work of Besley and Coate (1997, 2001), Felli and Merlo (2001) study an alternative citizen-candidate model of electoral competition with “menu-auction” lobbying, assuming that the elected policy maker selects the lobbies that take part in the policy-making process. In a “menu-auction,” equilibrium comprises a set of contribution schedules that are optimal for the interest groups in light of the anticipated behavior of the politician, who selects a policy that is his best response to the implicit offers of the interest groups.

But an alternative political economic equilibrium that we propose in this book, is not based on the view of lobbies as principals and the government as an agent, but on the reverse view: that of government as principal and interest groups as agents. In this equilibrium, the policy proposals that affect the interest groups take into account the anticipated outcome of the lobbying contest that hinges on the lobbying efforts of the interest groups. In this alternative setting, the lobbying efforts are directed at the politician who approves one of the proposed policies. We disregard lobbying by information transmission; the use of information as a tool for political influence (see Part II in Grossman and Helpman, 2001), and deal exclusively with lobbying activities that take the form of investment of resources that influence the decision of the politician. The contest outcome consists of the proposed public policy and of the efforts made by the contestants that determine the winning probabilities of the proposed policies. In the first two-stage extended public-policy game that we study, the public policy is proposed by the government (a bureaucrat or a civil servant). In the second, the proposed public policy is again approved or rejected in the second-stage contest, but the public policy is proposed by the interest groups. Note that the interest groups can also try to influence the proposed policy. In our setting, the proposed policy is not directly affected by lobbying groups. However, it is indirectly affected by interest groups in light

of the public-policy setter's awareness of the lobbying efforts of the interest groups and their effect on the outcome of the contest.

A major advantage of the studies that model lobbying as a "menu-auction" is that they have explicit microfoundations. However, the results derived from these valuable models critically depend on the assumed political institutions, agents' preferences and policy space. For example, as noted by Persson and Tabellini (2000), when studying electoral competition, two-party or two-candidate elections are assumed. The treatment of a legislative decision usually entails drastic simplifications, particularly when modeling the process of government formation and dissolution in parliamentary democracies. The role of government administration in shaping the details of economic policy is almost always ignored. The policy space is often assumed to be unidimensional and preferences are usually represented by restricted single-peaked or concave utility functions. The study of the regularities of the effect of lobbying on the nature of public policy in representative democracies and, certainly, in nondemocratic political environments cannot therefore be based on such elaborate models, because they are sensitive to the institutional setting and to assumptions regarding the nature of the policy space or the agents' preferences. We believe that the study of such regularities can be based on the complementing, reduced-form, simple, extended-contest approach that we propose, which captures the basic forces affecting the relationship between policy and lobbying or influence activities in a large variety of democratic and nondemocratic political environments. The contest approach is not useful for dealing with important theoretical topics such as the role of asymmetric information in politics nor is it suitable for studying economic policy determination in a general equilibrium setting, given a particular set of political institutions. It is useful, however, for explaining the basic interrelationships between public policy, the government's objectives and the characteristics of the interest groups that engage in influence activities. This approach, which was proposed by Tullock (1980), has been extensively enriched and generalized.¹ The first extended contest that enables the study of public-policy determination by the government was proposed in Epstein and Nitzan (2003a, 2003b). This extended contest emphasizes the dual importance of the government as an agenda setter and as a decision maker that approves or rejects policy proposals, while highlighting the significance of lobbying by organized interest groups and the prevalence of rent-seeking activities. This model fits political economic environments (democratic or nondemocratic) in which public policy is shaped by a two-tier government² and by affected interest groups. In gov-

¹ The list of references in the latest survey of rent-seeking literature, a survey that focuses on the modeling of rent-seeking contests (see Nitzan, 1994), contains more than one hundred items. Presently, the number of papers in this literature has almost tripled.

² Endogenous policy models often neglect the fact that public policy is often the outcome of decisions made by both elected politicians and bureaucrats. See, however, Hoyt and Toma (1989), Mazza and van Winden (1999) and Swank,

ernment, there are two levels of decision making. Bureaucrats work out the details of the proposed public policy, while elected politicians make the final decision on approval or rejection of the proposed policy. Our proposed stylized model thus captures the hierarchical nature of the decision-making process and the division of labor in government decision making between bureaucrats and politicians. It takes into account the significant role of agenda setters as well as the important role of the actual decision makers, the politicians. The dichotomous nature of decisions made by the politicians (approve or reject), and the dual nature of the public decision-making process that consists of *certain* proposals and *uncertain* approval of these proposals are also taken into account. The second extended contest that enables the study of public-policy determination not by the government, but by interest groups was proposed in Epstein and Nitzan (2004). Here, the politician still selects one of the proposed policies, but these are determined by the contesting interest groups in the first stage of the game. Notice that both of the extended contests that we study can be used to shed light on public-policy determination in modern democracies as well as in nondemocratic political environments.

The main shortcoming of the contest approach is that it does not have microfoundations. In particular, the contest success function (CSF), which is a crucial component in this model, is exogenous, and this implies that the behavior of the government is ad hoc as no attempt is made to rationalize it. Hirshleifer and Riley (1992) and Baye and Hoppe (2003) have attempted to justify particular CSFs using probability models. The CSF proposed by Tullock (1980) emerges from a simple search problem; see Konrad (2006) for a comprehensive survey of these attempts. We propose an alternative partial microfoundation for the CSF that plays such a central role in the literature on contests or rent-seeking games, and, in particular, in the proposed extended public-policy game mentioned above. Our rationalization (see Epstein and Nitzan, 2006c) hinges on the existence of government (politician) preferences that take into account the lobbying outlays of the interest groups, in addition to the public well being. A simple, fundamental condition rationalizes the random behavior of the government and, in turn, the existence of a CSF that is assumed to be exogenous in numerous studies in the contest literature.

We conclude the introduction by briefly relating to (i) the structure of the book and its rationale, (ii) the core of the book and (iii) the nature of the pursued analysis.

The book consists of five parts. Since strategic contest theory is our basic methodology, in Part A we introduce the basic public-policy contest that we apply in the two models of endogenous public-policy determination studied and then suggest a partial rationalization for its existence.³ Parts B and D are devoted to the two alternative two-stage extended public-policy contests,

Letterie and van Dalen (1999), who analyze public-policy determination using alternative models of two-tier decision-making bodies.

³ Chapter III in part A is based on Epstein and Nitzan (2006c).

where the government or the interest groups control the proposed policy.⁴ In light of the special significance of the relationship between public policy and the behavior of interest groups, we investigate, in Part C, a general class of two-player public-policy contests focusing on the effect of a change in the proposed policy, a change that may affect the payoffs of one or both of the contestants, on their effort (the resources they expend on lobbying, rent-seeking or influence activities) and performance (their probability of winning the public-policy contest).⁵ The last part, E, includes five illustrations of the usefulness of the extended contests presented in Parts B and D that deal, respectively, with monopoly-price determination, privatization, migration policy, minimum wage and promotion tournaments.⁶

The core of the book consists of six chapters: Chapters II, III, IV, VII, XI and XII. Chapters II and III are essential for understanding the subsequent material because they present the standard rent-seeking contest in a form suited to the purpose of the book and explain its rationale in the context of public-policy determination. Chapter IV and Chapter XI contain essential material related to the two extended public-policy contests. Given the significance of the comparative statics analysis with respect to the proposed public policy in both of the extended contests studied, the material presented in Chapter VII is indispensable. Chapter XII, on monopoly-price determination, vividly illustrates the usefulness of both of our proposed models. This application is the economic context that we first studied when considering the actual endogenous determination of public policy in an extended two-stage contest on the prizes implied by the proposed public policy. We therefore have special sympathy and a feeling of gratitude to this application that served as the catalyst for the research project that resulted in this book.

And, finally, a remark on the comparative-statics analysis of parts B, C, D and E. This analysis is of two types. First, we examine the sensitivity of the equilibrium variables in the extended contests to the parameters of the model. For example, we investigate the effect of a change in the political culture on the proposed policy, the efforts made by the contestants, their winning probability and their welfare. Secondly, we examine the effect of a change in the applied setting on the variables that are endogenously determined in the extended contests. For example, we compare efforts, winning probabilities and welfare of the interest groups in the extended contest to their values in the alternative settings where public policy is not endogenous.

⁴ In part B, Chapters IV and V are both based on Epstein and Nitzan (2002a), (2002b). Chapter VI is based on Epstein and Nitzan (2006a). In part D, Chapters X and XI are based, respectively, on Epstein and Nitzan (2003a), (2004).

⁵ In part C, Chapter VII is based on Epstein and Nitzan (2006b), Chapter VIII is based on Epstein and Nitzan (2005), (2006d) and Chapter IX on Epstein and Nitzan (2002c).

⁶ The monopoly, privatization and migration application in part E are based, respectively, on Epstein and Nitzan (2003b), Druk-Gal, Epstein and Nitzan (2004) and Epstein and Nitzan (2006e).

The political economy of endogenous public-policy determination must be based on specific assumptions regarding the interaction between economic and political processes. Given the abundance of such possible assumptions and the complexity of the political economic environment, our proposed complementing approach should naturally be viewed as an additional element in the series of attempts intended to yield a plausible fruitful positive theory of public-policy determination that seems crucial to modern public economics.

The Basic Contest

In this part we introduce the basic policy contest that we apply throughout the book and rationalize its existence.

II

The Policy Contest

1 Policy and Stakes

Suppose that a policy I is proposed by the government (a ruling politician or a bureaucrat). Two interest groups, the players or the contestants i and j , compete on the approval or rejection of I . Approval is the preferred policy of one player, say player i , whereas rejection of the proposed policy is the preferred policy of the other player. Approval implies that player i wins the contest. The present discounted value of the preferred outcome to player i is equal to u_i and the value of this outcome to his opponent, player j , is equal to v_j . Approval of the proposed policy is associated with a positive payoff for player i , since, by assumption, $u_i > v_i$. Similarly, rejection is associated with a positive payoff for player j , since, $u_j > v_j$. Note that, in general, the players' payoffs corresponding to the approval and rejection of the policy I depend on I . Player i 's preferred contest outcome, namely the approval of I , is reached in probability Pr_i . The probability of player j 's preferred contest outcome is Pr_j , $\text{Pr}_j = 1 - \text{Pr}_i$. These winning probabilities depend on the efforts made by the two contestants, x_i and x_j .

The expected net payoff of the risk-neutral player i is equal to:

$$E(w_i) = \text{Pr}_i u_i(I) + \text{Pr}_j v_i(I) - x_i, \quad i \neq j. \quad (\text{A.1})$$

Denote by $n_i = (u_i - v_i)$ the stake of player i (his benefit from winning the contest), (see Baik, 1999, Epstein and Nitzan, 2002b, and Nti, 1999). A player's stake is secured when he wins the contest, that is, when his preferred policy is the outcome of the contest. Recall that for one player the desirable outcome is associated with the approval of the proposed policy while for the other player the desirable outcome is realized when the proposed policy is rejected. The expected net payoff of interest group i can be rewritten as follows:

$$E(w_i) = v_i(I) + \text{Pr}_i n_i(I) - x_i. \quad (\text{A.2})$$

In general, the stakes of the contestants may differ, one of them having an advantage over the other in terms of his benefit from winning the contest. In

such cases, we will refer to the advantageous higher-stake contestant as player H and to his opponent, the lower-stake contestant as player L . Given that $n_L \leq n_H$, the ratio n_L/n_H is a measure of the asymmetry between the stakes of the contestants.

Since $v_i(I)$ is the minimum benefit obtained by interest group/contestant i , regardless of the outcome of the contest, we can concentrate on his expected net payoff, disregarding this value. Such a simplification will no longer be legitimate when changes in the proposed policy I are allowed to affect the different contest outcomes. At this stage, however, the objective function of the contestant can be written as

$$E(u_i) = \Pr_i n_i(I) - x_i. \quad (\text{A.3})$$

We will refer to this expression as the net payoff of the contestant.

An Example

To illustrate the determination of stakes by a proposed policy, let us consider the following example of monopoly regulation (see Fig. A.1). The two contestants are a producer and an interest group representing the consumers. Suppose that the status-quo price in some market is the surplus-maximizing price P_{mc} , the price at which the marginal cost curve intersects the demand curve^{7,8} and the proposed new price is the standard profit-maximizing monopoly price P_m . The equilibrium quantities corresponding to these prices are Q_{mc} and Q_m , respectively. The producer's benefit in the event that he wins the contest and the proposed price P_m is approved is equal to the monopoly profit at this price, $B + D$. In such a case, the consumers' surplus is given by A . The consumers' benefit if they win the contest and the status-quo price P_{mc} prevails (the proposed price P_m is rejected) is equal to their surplus under the competitive price, $A + B + C$. In such a case, the producer's benefit is given by $D + E$.

Note that regardless of the contest outcome the consumers will always have at least a surplus of A . Their stake in the contest is therefore equal to $n_c = A + B + C - A = B + C$. The producer's stake is equal to the difference between his surplus of $B + D$, when the price is P_m and the surplus of $D + E$, when the price set equals P_{mc} . Hence his stake in this contest is equal to $n_f = B + D - (D + E) = B - E$. In this example the contestants' stakes are different; the consumers' stake is higher than that of the producer.

⁷ We disregard the producer's fixed costs, assuming that his normal profit is sustained for any price that is equal to or higher than P_{mc} .

⁸ An alternative candidate for the status-quo price is the unregulated standard profit-maximizing monopoly price P_m . Our illustration is robust to the selection of this alternative status-quo price.

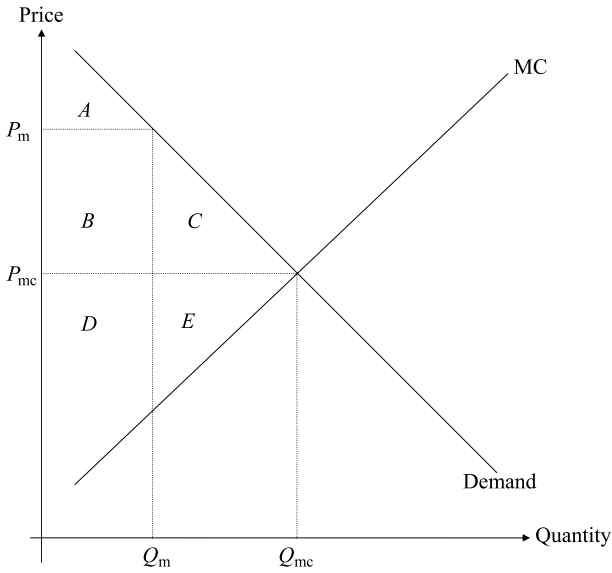


Fig. A.1.

2 Contest Equilibrium

The function that specifies the winning probabilities of the contestants corresponding to their efforts, the contest success function (CSF), is an important component of the policy contest. In this section we focus on contest equilibrium under two specific contest success functions. These CSFs are the most commonly assumed functions in the contest literature. The first is the logit CSF, first studied by Tullock (1980), under which the probability of winning the contest is a continuous function of the efforts invested in the contest. The second CSF, which is not continuous, is often applied in auctions. This CSF is referred to as the all-pay auction, see Hillman and Riley (1989). It unambiguously determines the contest winner by comparing the expenditures of the contestants. The contest equilibrium outcome derived under the above two CSFs consists of the contestant's efforts (lobbying expenditures, influence activities, rent-seeking outlays) that directly yield their winning probabilities and their expected net payoff. The equilibrium analysis of this section will be repeatedly applied in later chapters that deal with endogenous policy determination under alternative extended policy contests.

a The Logit (Generalized Lottery) CSF

The logit contest success function which is also referred to as the generalized lottery function (Tullock 1980, Lockard and Tullock, 2001) is given by:

$$\Pr_i = \frac{dx_i^r}{dx_j^r + x_i^r} \quad \text{for } r \leq 2 \quad \text{and } d > 0.$$

The return to effort according to this lottery function is captured by the parameter r .⁹ The other parameter d is a positive. If $d > 1$, then player i has an advantage over player j in terms of ability to affect the contest outcome, that is, in terms of the ability to turn effort into winning probability. To simplify our calculations in this preliminary section, we will focus on the case where $r = 1$ and $d = 1$. The contest success function is thus given by

$$\Pr_i = \frac{x_i}{x_j + x_i} \quad \text{for } i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.4})$$

The contest outcome in this case is determined by the symmetric simple lottery (see Tullock 1980). From Eq. (A.3), the expected net payoff of interest group i is given by

$$E(u_i) = \frac{x_i}{x_i + x_j} n_i - x_i \quad \forall i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.5})$$

The first-order conditions for the maximization of this expression that characterize an interior equilibrium of the contest are given by

$$\frac{\partial E(u_i)}{\partial x_i} = \frac{x_j}{(x_i + x_j)^2} n_i - 1 = 0 \quad \forall i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.6})$$

The second-order equilibrium conditions are satisfied since

$$\frac{\partial^2 E(u_i)}{\partial x_i^2} = \frac{-2x_j}{(x_i + x_j)^3} n_i < 0 \quad \forall i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.7})$$

Denote by x_i^* ($i = 1, 2$) the equilibrium efforts invested by interest group i . Solving the system of equalities characterizing the contest equilibrium, we obtain that the equilibrium efforts invested by the contestants are equal to

$$x_i^* = \frac{n_i^2 n_j}{(n_i + n_j)^2} \quad \forall i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.8})$$

⁹ When r approaches infinity the generalized lottery function becomes the all-pay auction under which the contestant making the highest effort wins the contest (see Baye, Kovenock and de Vries, 1993). One possible rationalization of this CSF is that the player with the higher stake has a weight of infinity and thus will win with probability one and the contestant with the lower stake will lose with probability 1.

Using Eqs. (A.8) and (A.3), we can calculate the equilibrium probability that contestant i wins the contest. Specifically,

$$\Pr_i^* = \frac{n_i}{n_i + n_j} \quad \forall i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.9})$$

Using Eq. (A.8), we can calculate the equilibrium total expenditure of the contestants. This expenditure is referred to in the literature as the rent dissipation (RD) of the contest and is denoted by X^*

$$X^* = \frac{n_i n_j}{n_i + n_j}. \quad (\text{A.10})$$

The equilibrium expected net payoff of contestant i , $E(u_i^*)$, is therefore given by

$$E(u_i^*) = \frac{n_i^3}{(n_i + n_j)^2} \quad \forall i, j = 1, 2 \text{ and } i \neq j. \quad (\text{A.11})$$

Notice that when the stakes of the two contestants are equal, $n_j = n_i = n$, the expenditure of each contestant is $x_i^* = x_j^* = \frac{n}{4}$; the winning probability of each player is equal to one-half, $\Pr_i^* = \Pr_j^* = \frac{1}{2}$; the expected payoff for each interest group is $E(u_i^*) = E(u_j^*) = \frac{n}{4}$; and the total effort–rent dissipation, made by the contestants is equal to $X^* = \frac{n}{2}$.

b The All-pay Auction

Under the all-pay auction the contestant that makes the larger effort wins with probability one. If the two contestants make the same effort, then the winner is chosen randomly. The probability of winning is thus given by

$$\Pr_i = \begin{cases} 1 & \text{if } x_i > x_j \\ 0.5 & \text{if } x_i = x_j \\ 0 & \text{if } x_j > x_i \end{cases} \quad (\text{A.12})$$

Without loss of generality, let us assume that $n_i > n_j$; that is, interest group i 's stake from winning the contest is larger than that of its opponent j . It is clear, therefore, that interest group i has an incentive to bid more than interest group j . However, it is not clear how much each player bids in equilibrium. As is well known, in such all-pay auctions there are no pure strategy equilibria (Hillman and Riley (1989), Ellingsen (1991), Baye, Kovenock and de Vries (1993)). Suppose that group j bids $0 < x_j \leq n_j$. Then the optimal response of group i is $x_i = x_j + \varepsilon < n_i$ (i.e. marginally higher than x_j). But then $x_j > 0$ cannot be an optimal response to $x_i = x_j + \varepsilon$. Also, it is obvious that $x_i = x_j = 0$ cannot be an equilibrium. Hence, there is no equilibrium in pure strategies. There is, however, a unique equilibrium in mixed strategies given by

the following cumulative distribution functions (see Hillman and Riley (1989), Ellingsen (1991) and Baye, Kovenock, and de Vries, 1993)):

$$\begin{aligned} G_i(x_i) &= \frac{x_i}{n_j} \quad \text{for } x_i \in [0, n_j] \quad \text{and} \\ G_j(x_j) &= 1 - \frac{n_j}{n_i} + \frac{x_j}{n_i} \quad \text{for } x_j \in [0, n_j]. \end{aligned} \quad (\text{A.13})$$

The equilibrium CDFs imply that group i bids uniformly on $[0, n_j]$, while group j puts a probability mass equal to $(1 - n_j/n_i)$ on $x_j = 0$. The expected lobbying expenditures are

$$E(x_i) = \int_0^{n_j} x_i dG_i(x_i) = \frac{n_j}{2} \quad \text{and} \quad E(x_j) = \int_0^{n_j} x_j dG_j(x_j) = \frac{n_j^2}{2n_i}. \quad (\text{A.14})$$

As can be easily verified, the advantageous interest group (the one with the higher stake) is more likely to win the contest.

The equilibrium winning probabilities of the two players are given by:

$$\Pr_i^* = \frac{2n_i - n_j}{2n_i} \quad \text{and} \quad \Pr_j^* = \frac{n_j}{2n_i}. \quad (\text{A.15})$$

The expected equilibrium net payoffs of the two interest groups are equal to

$$E(u_i^*) = n_i - n_j \quad \text{and} \quad E(u_j^*) = 0. \quad (\text{A.16})$$

In equilibrium, the expected total effort (expected rent dissipation) of the contestants is equal to

$$E(X^*) = E(x_i^* + x_j^*) = \frac{n_j(n_j + n_i)}{2n_i}. \quad (\text{A.17})$$

Finally, notice that if the two contestants have identical stakes, $n_j = n_i = n$, then the expenditure incurred by each group is $E(x_i^*) = E(x_j^*) = \frac{n}{2}$; the winning probability of each player is equal to one-half, $\Pr_i^* = \Pr_j^* = \frac{1}{2}$; the expected net payoff of each contestant is zero, $E(u_i^*) = E(u_j^*) = 0$; and the total effort invested in the contest equals $X^* = n$. Comparison of the simple lottery contest and the all-pay auction reveals that under the assumption of identical stakes, the winning probabilities of the contestants under the two CSFs are equal to one half, however, under the former lottery CSF the contestants' total effort is smaller and their expected net payoff is larger.

III

Contest Rationalization – Microfoundations

Much of the recent literature in political economy is based on models that are useful for analyzing the interrelationship between economic and political agents under alternative given institutional settings, see Persson and Tabellini (2000) and Grossman and Helpman (2001) and the references therein. Typically, in the overall game-theoretic equilibria in these settings, economic and political outcomes are mutually consistent. A major advantage of these models is that they have explicit microfoundations. However, the results derived from these valuable models critically depend on the assumed political institutions, agents' preferences and policy space.¹⁰ The study of the regularities of the effect of lobbying on the nature of public policy in representative democracies cannot therefore be based on such elaborate models, because they are sensitive to the institutional setting and to the assumptions regarding the nature of the policy space or the agents' preferences. Our claim is that the study of such regularities can be based on the complementing, reduced-form, simple contest approach presented in the preceding chapter that captures the basic forces affecting the relationship between policy and lobbying in a large variety of democratic political environments. The contest approach is not useful for dealing with important theoretical topics such as the role of asymmetric information in politics. It is also not suitable for studying economic policy determination in a general equilibrium setting, given a particular set of political institutions. It is useful, however, for explaining the basic interrelationships between public policy, the government's objectives and the characteristics of the interest groups that engage in influence activities. This approach,

¹⁰ For example, as noted by Persson and Tabellini (2000), when studying electoral competition, two-party or two-candidate elections are assumed. The treatment of legislative decision usually entails drastic simplifications, particularly when modeling the process of government formation and dissolution in parliamentary democracies. The role of government administration in shaping the details of economic policy is almost always ignored. The policy space is often assumed to be uni-dimensional and preferences are usually represented by restricted single peaked or concave utility functions.

which was proposed by Tullock (1980), has been extensively enriched and generalized.¹¹ An extended such contest that enables the study of public-policy determination has been proposed in Epstein and Nitzan (2002b). This extended contest, which will be presented and thoroughly analyzed in Parts B and C, emphasizes the dual importance of the government as an agenda setter and as a decision maker that approves or rejects policy proposals, while highlighting the significance of lobbying by organized interest groups and the prevalence of rent-seeking activities. Albeit, the main shortcoming of the contest approach is that it does not have microfoundations. In particular, the contest success function (CSF), which is a crucial component in this model, is exogenous and this implies that the behavior of the government is ad hoc as no attempt is made to rationalize it. The objective of the present chapter is to provide a partial microfoundation for the CSF that plays such a central role in the literature on contests or rent-seeking games, and, in particular, in the extended public-policy game mentioned above.¹² Our rationalization of such CSFs hinges on the existence of government (politician) preferences that take into account the lobbying outlays of the interest groups, in addition to the public well being.¹³ A simple, fundamental condition rationalizes the random behavior of the government and, in turn, the existence of a CSF that is assumed to be exogenous in numerous studies in the contest literature.¹⁴ As already noted, the most commonly used CSFs are Tullock's (1980) logit-form functions and the function associated with all-pay auctions that awards the prize to the most active rent seeker, see Hillman and Riley (1989). In public-policy contests the government is usually assumed to be a passive player that only randomly approves or rejects policy proposals, see Epstein and Nitzan (2004), (2003b), as in the standard contest literature. In the extended public-policy contest, the government is an active rational "principal" who determines policy in two senses; it proposes the policy and randomly approves or rejects it. In this extended setting, the government selects a policy anticipating the lobbying efforts of the interest groups. On the one hand, it acts rationally in selecting a proposed policy (in setting the agenda) and, on the other hand, it acts randomly (seemingly "irrationally") in approving or rejecting its proposed policy. The main result of the present chapter establishes that under an appropriate mix of objectives (desire to enhance the

¹¹ The list of references in the last survey of the rent-seeking literature, a survey that focuses on the modeling of rent-seeking contests, see Nitzan (1994), contains 104 items. Presently, the number of papers in this literature has risen to more than 260.

¹² For the related pressure-group literature, see for example, Becker (1993) and Glazer and McMillan (1992).

¹³ The lobbying efforts on which we focus are interpreted as resources that buy influence (e.g., campaign contributions) rather than resources involved in the dissemination of information by one means or another. For a detailed discussion on these alternative lobbying activities, see Grossman and Helpman (2001).

¹⁴ For an axiomatic characterization of CSFs, see Skaperdas (1996).

public well being and desire to increase the lobbying outlays), random behavior in the former narrower setting and “mixed” behavior in the extended latter setting is rational¹⁵. We will then illustrate the rationalization of the most widely studied contests and clarify under what conditions a logit-form CSF is preferred, equivalent or inferior to the all-pay auction.

1 The Public-policy Contest

In the basic one-stage contest setting presented in the previous chapter there are two risk-neutral interest groups, the low- and high-benefit groups L and H . Both interest groups are directly affected by the government’s (politician’s) choice of one of two exogenously given policies. The stake of player i ($i = L, H$) is denoted by n_i , where $n_H \geq n_L$. Being chiefly concerned with the conditions under which random behavior is an optimal strategy for the government, we assume that the government has full knowledge of the players’ stakes. Providing a convincing justification for random government behavior under this assumption implies that our argument is certainly valid in the general incomplete information setting. In the contest, the government has no control on the agenda: the two possible policies. Typically, one policy is the status-quo policy and the other policy is some new alternative policy and the government has to approve or reject the proposed new policy. In the extended two-stage contest the government controls the agenda. Typically, in the first stage of the game, it selects the proposed new alternative policy. In the second stage of the game, the payoffs of the two interest groups again depend on the binary policy choice of the government: the approval or rejection of the proposed new policy.

The government could decide to select the policy that results in the realization of the higher stake, i.e. the policy that generates the stake n_H for H .¹⁶ An alternative option for the government is to choose randomly between the two different policies that it faces. Clearly, if the utility the government derives from the selection of a policy is positively related to the aggregate net payoffs (stakes) of the interest groups, then it would never randomize, that is, it would select the policy that generates the higher stake.¹⁷

¹⁵ For a different microeconomic rationalization of Tullock’s (1980) logit CSF, which is based on a simple search problem where an uninformed benevolent dictator tries to make the best decision only from the social welfare point of view, see Hirschleifer and Riley (1992) and Konrad (2006). For a discussion on rational policy-target ambiguity in electoral competition, see Alesina and Cukierman (1990) and Shepsle (1972).

¹⁶ In the extended game, this option exists for any two feasible policies and, in particular, for the equilibrium pair of policies (the status-quo policy and the equilibrium alternative proposed policy).

¹⁷ In our complete information setting, a lottery on the possible policies is an inferior strategy. Under incomplete information, however, where the former strategy is

There is yet a third possibility. The politician can deliberately create a public-policy contest the outcome of which is the probability of realization of the two possible policies: the status-quo policy and the new policy proposal. By assumption, the approval of the proposed policy results in its realization and its rejection implies that the alternative status-quo policy is realized. The probabilities of realization of the two policies in the complete-information public-policy contest (in the basic or in the extended contest) are given by the contest success function (CSF). This function specifies the relationship between the interest groups' investment in the so-called influence, lobbying or rent-seeking activities and the probability of realization of the two policies.¹⁸ $\Pr_i$ denotes the probability of realization of player i 's preferred policy (see, for example, Baik (1999), Epstein and Nitzan (2004), (2003b), (2002b) and Nti (1997)). A player's stake is secured if he wins the contest, that is, if ex post his preferred policy is the outcome of the contest. Recall that for one player the desirable outcome is associated with the approval of the proposed policy while for the other player the desirable outcome is realized when the proposed policy is rejected. Given the CSF and the stakes, the expected net payoff (surplus) of interest group i can be written as follows:

$$E(u_i) = \Pr_i n_i(I) - x_i. \quad (\text{A.3})$$

If the risk-neutral player i chooses a pure strategy, x_i denotes his lobbying effort. If he chooses a mixed strategy, x_i denotes his expected effort.

As commonly assumed in the recent political economy literature, Grossman and Helpman (2001), Persson and Tabellini (2000), let the government's objective function be a weighted average of the expected social welfare and lobbying efforts:

$$G(\cdot) = \alpha (E(u_L) + E(u_H)) + (1 - \alpha) (x_L + x_H). \quad (\text{A.18})$$

The parameters α and $(1 - \alpha)$ are the weights assigned to the expected social welfare and the contestants' lobbying outlays.

2 The Condition for Preferred Randomness

If the government decides not to generate a contest and choose the policy that generates the higher stake n_H ,¹⁹ then the value of the government's objective

not feasible, a lottery can be an efficient strategy. In particular, although it is vulnerable to resource misallocation, it can dominate some alternative nonmarket allocation mechanism like a waiting line auction (queue system) that involves rent-seeking costs, Boyce (1994), Holt and Sherman (1982), Suen (1989), Taylor, Tsui and Zhu (2001) and Koh, Yang and Zhu (2002).

¹⁸ Modeling the contestants as single agents presumes that they have already solved the collective action problem. The model thus applies to already formed interest groups.

¹⁹ In the extended public-policy contest, the relevant n_H corresponds to the subgame perfect equilibrium policy proposal of the government.

function is equal to αn_H . It is therefore sensible for the government to create a contest if and only if the expected value of its objective function increases as a result of the existence of the contest. That is,²⁰

$$\alpha (E(u_L) + E(u_H)) + (1 - \alpha)(x_L + x_H) > \alpha n_H. \quad (\text{A.19})$$

Rewriting Eq. (A.19), given Eq. (A.3), $\text{Pr}_L + \text{Pr}_H = 1$, $\text{Pr}_i > 0$ (both players participate in the contest) and $n_H = b n_L$, where $b \geq 1$, we obtain:

$$\frac{(1 - 2\alpha)(x_L + x_H)}{\alpha \text{Pr}_L} > (b - 1)n_L. \quad (\text{A.20})$$

Whether this condition is satisfied or not hinges on the CSF, on the parameters n_L , b and α that represent the contestants' stakes and the weights assigned by the governments to its two utility components, and on the resulting equilibrium lobbying efforts of the contestants $x_L + x_H$ and, in turn, on their contest-winning probabilities Pr_L and Pr_H . Given the CSF and the three parameters, the above condition is satisfied if the lobbying efforts of the interest groups are sufficiently large or the contest-winning probability of the low-stake player is sufficiently low. This simple condition has the following straightforward implications regarding the effect of the parameters:

- (i) When $b \geq 1$, inequality (A.20) requires that $\alpha < 0.5$. That is, a necessary condition for the existence of an effective incentive for a politician to create a contest is that the weight he assigns to social welfare is lower than the weight assigned to the contestants' lobbying outlays, $\alpha < 0.5$. More generally, Eq. (A.20) highlights which parameter values of $(1 - \alpha)$ make random behavior more attractive to the government. A sufficiently low level of this parameter implies that random behavior is irrational. In such a case, the government would not bother to create a contest. If $(1 - \alpha)$ is sufficiently high, namely, the government assigns a sufficiently high weight to the lobbying outlays of the interest groups, then it is sensible to create a contest and act randomly in approving or rejecting the policy it proposes. A rational politician who only cares about the public well being will never choose to act randomly.²¹ If he only

²⁰ Notice that the lobbying efforts and the corresponding contest winning probabilities of the players and their expected payoffs are computed in the Nash equilibrium of the public-policy contest.

²¹ When lobbying takes the form of information transmission, it can be a welfare-enhancing activity, Gradstein (2002), Lagerlof (1997) (The allocative efficiency role of rent seeking in the context of the internal organization of a firm was pointed out already in the early 1980s by Lazear and Rosen (1981)). In such a case the existence of a contest could be rationalized not only when the government assigns a higher weight to the extraction of resources from the lobbies, but also when it assigns a higher weight to the well being of the contestants and even when $\alpha = 1$.

cares about extracting tangible rents for himself, as explicitly or implicitly assumed in many studies that followed Tullock (1980), that is, if $(1 - \alpha) = 1$, then acting randomly is his preferred alternative, provided that the contestants' lobbying efforts are positive.

- (ii) If the contest is symmetric in terms of the lobbies' stakes, ($n_L = n_H$, i.e. $b = 1$ and $\alpha < 0.5$), then the government always prefers to act randomly according to the CSF of this contest, rather than select the policy yielding the higher stake with certainty. The reason for this is that when both stakes are identical $\Pr_H n_H + \Pr_L n_L = n$. The politician therefore always gains αn , regardless of who wins the contest. In such a case any contest that generates positive lobbying efforts is preferred to the "no contest" alternative, provided that the weight assigned to the lobbying efforts is larger than the weight assigned to the aggregate net payoffs of the interest groups.
- (iii) Rational randomness, i.e. preference of a contest, requires the existence of contest equilibrium. In the case of a pure strategy equilibrium, the following first- and second-order existence conditions:

$$\frac{\partial \Pr_i}{\partial x_i} > 0 \quad \frac{\partial \Pr_i}{\partial x_j} < 0 \quad \text{and} \quad \frac{\partial^2 \Pr_i}{\partial x_i^2} < 0$$

are also required for the government to prefer its seemingly ad hoc random behavior according to the CSF. Notice that these conditions also ensure that as the stake of a player increases, his effort as well as his expected payoff are increased.²²

²² To ensure that the equilibrium is a pure strategy Nash equilibrium and that it is unique, in addition to the assumed properties of the CSF, we have to add the following requirement (see Skaperdas, 1992):

$$\begin{aligned} & \Pr_i(x_i, x_j) (1 - \Pr_i(x_i, x_j)) \frac{\partial^2 \Pr_i(x_i, x_j)}{\partial x_i \partial x_j} \\ & + (2\Pr_i(x_i, x_j) - 1) \frac{\partial \Pr_i(x_i, x_j)}{\partial x_i} \frac{\partial \Pr_i(x_i, x_j)}{\partial x_j} = 0. \end{aligned}$$

This condition is satisfied if $\frac{\partial^2 \Pr_i(x_i, x_j)}{\partial x_i \partial x_j} \begin{matrix} > \\ = 0 \\ < \end{matrix}$ iff $\Pr_i(x_i, x_j) \begin{matrix} > \\ = 0.5 \\ < \end{matrix}$. This plausible assumption means that player i has an advantage in terms of ability, if a change in j 's effort positively affects his marginal winning probability. In other words, a positive (negative) sign of the cross second-order partial derivative of $\Pr_i(x_i, x_j)$, $\frac{\partial^2 \Pr_i}{\partial x_j \partial x_i}$, implies that i has an advantage (disadvantage) when j 's effort changes. Note that this assumption is satisfied by many contest success functions that have been studied in the literature (see Skaperdas, 1992).

(iv) The LHS of Eq. (A.19) can be rewritten as:

$$\beta_1 (\text{Pr}_L n_L + \text{Pr}_H n_H) + \beta_2 (x_L + x_H) ,$$

where $\beta_1 = \alpha$ and $\beta_2 = 1 - 2\alpha$. To satisfy the inequality $\frac{(1-2\alpha)}{\alpha} > 1$, the weight β_1 assigned to the expected stakes $(\text{Pr}_L n_L + \text{Pr}_H n_H)$ must be smaller than the weight β_2 associated with the lobbying effort $(x_L + x_H)$, that is, $\beta_1 < \beta_2$. In terms of the parameter α , this condition becomes: $\alpha < 1/3$. For $\alpha < 1/3$, which satisfies the necessary condition for the superiority of the random contest behavior, a sufficient condition for Eq. (A.20) to hold is that, in equilibrium, $x_L + x_H > n_H - (\text{Pr}_H n_H + \text{Pr}_L n_L)$ or, equivalently, $x_L + x_H > \text{Pr}_L (n_H - n_L) = \text{Pr}_L (b - 1) n_L$. This means that for $\alpha < 1/3$, the contest should generate outlays that are larger than the expected difference between the contestants' stakes. As is already known, when both stakes are equal, $n_L = n_H = n$, this condition is satisfied.

3 Applications

a The Most Common CSFs

The following examples of some of the most widely studied CSFs illustrate the applicability of the condition for preferred randomness.

a.1 The All-pay Auction

Under the extensively studied all-pay auction, see, for example, Hillman and Riley (1989),²³ in equilibrium,

$$E(x_L^* + x_H^*) = \frac{n_L (n_L + n_H)}{2n_H} \quad \text{and} \quad \text{Pr}_L^* = \frac{n_L}{2n_H} .$$

Therefore,

$$\frac{(1 - 2\alpha)}{\alpha} \frac{(x_L^* + x_H^*)}{\text{Pr}_L^*} = \frac{(1 - 2\alpha)}{\alpha} (b + 1) n_L .$$

Inequality Eq. (A.20) is thus satisfied iff $\alpha < \frac{b+1}{3b+1}$. This latter condition is satisfied if $\alpha < 1/3$. We conclude therefore that from the government standpoint, the all-pay auction is always preferred to “no contest” whenever $\alpha < 1/3$. If $1/2 > \alpha > 1/3$, then the all-pay auction is preferred to “no contest”, provided that the stake asymmetry is sufficiently small.

²³ Konrad (2002) investigates an asymmetric all-pay action where the incumbent enjoys an advantage.

a.2 The Lottery Logit Functions

(i) The Discriminating Lottery Function:

Under this CSF, Gradstein (1995), Nti (1997),

$$\Pr_L = \frac{x_L}{dx_H + x_L} \quad \text{for } x_H, x_L, d > 0.$$

In equilibrium,

$$\Pr_L^* = \frac{n_L}{n_L + dn_H} \quad \text{and} \quad x_L^* + x_H^* = \frac{dn_L n_H (n_L + n_H)}{(dn_H + n_L)^2}.$$

Therefore Eq. (A.20) is satisfied iff

$$\frac{(1 - 2\alpha)}{\alpha} \frac{db(b+1)}{(db+1)} > (b-1).$$

When $d = 1$, the CSF is the nondiscriminating commonly used Tullock's lottery function. It can be readily verified that for $d = 1$, the nondiscriminating Tullock's contest is always preferred to "no contest" whenever $\alpha < 1/3$. Under the more general discriminating CSF, $\alpha < 1/3$ and $d > \frac{(b-1)}{2b}$ are sufficient conditions for the fundamental condition Eq. (A.20) to be satisfied. That is, for the contest to be preferred to a certain approval or rejection, the weight assigned by the government to the contestants' aggregate expected payoffs has to be less than $1/3$ and the asymmetry factor of the high-stake player has to exceed $\frac{(b-1)}{2b}$. Notice that d is the weight assigned to the player with the higher stake. The condition implies that the skill effectivity of the high-stake player must be sufficiently high. The value of d can be smaller than one since d must only be larger than $\frac{(b-1)}{2b}$, which is smaller than one. That is, although the lobbying effectivity of the high-stake player must be sufficiently high, he can still be disadvantaged in terms of his lobbying skills. This means that for a sufficiently small α , $\alpha < 1/3$, the contest is preferred to "no contest", if stake asymmetry is sufficiently low. But the asymmetry in lobbying effectivity can be either sufficiently low or sufficiently high, dependent on whether the high-stake player is disadvantaged or advantaged in terms of lobbying skills.

(ii) The Generalized Lottery Function:

Under this CSF, Lockard and Tullock (2001),

$$\Pr_L = \frac{x_L^r}{x_H^r + x_L^r} \quad \text{for } r \leq 2.$$

In equilibrium,

$$\Pr_L^* = \frac{n_L^r}{n_L^r + n_H^r} \quad \text{and} \quad x_L^* + x_H^* = \frac{rn_L^r n_H^r (n_L + n_H)}{(n_H^r + n_L^r)^2}.$$

Therefore Eq. (A.20) is satisfied iff

$$\frac{(1-2\alpha)}{\alpha} \frac{rb^r(b+1)}{(b^r+1)} > (b-1) .$$

In this case the contest is always preferred to “no contest” whenever $\alpha < 1/3$ and $r \geq 1$. Given b , the condition provides a lower bound for r . As r decreases the return to effort decreases and, therefore, in equilibrium the effort invested in the contest decreases and so, for a sufficiently low level of the coefficient r , condition Eq. (A.20) will not be satisfied.

b Comparison of the Common CSFs

Let us now compare the three different CSFs presented above determining which of them would be preferred by a politician who designs the contest between the interest groups. Clearly, the preferred CSF results in the highest utility $G(\cdot)$. We thus compare the LHS of Eq. (A.20) corresponding to the different CSFs.

b.1 The All-pay Auction vs. the Discriminating Lottery Function

The all-pay auction is preferred to the discriminating lottery function iff

$$\frac{(1-2\alpha)}{\alpha} (b+1) n_L > \frac{(1-2\alpha)}{\alpha} \frac{db(b+1)}{(db+1)} n_L , \quad \text{namely, iff } 1 > \frac{db}{(db+1)} .$$

Since this latter inequality is always satisfied, the all-pay auction is preferred to the discriminating lottery function. The plausibility of the discriminating lottery function hinges therefore on the infeasibility of the CSF associated with the all-pay auction. Such infeasibility is possible, for example, when the political culture forbids a discriminating CSF of the sort corresponding to the all-pay auction.

b.2 The All-pay Auction vs. the Generalized Lottery Function

The all-pay auction is preferred to the generalized lottery function iff $\frac{(1-2\alpha)}{\alpha} (b+1) n_L > \frac{(1-2\alpha)}{\alpha} \frac{rb^r(b+1)}{(b^r+1)} n_L$, namely, iff $1 > \frac{rb^r}{(b^r+1)}$, or $1 > (r-1)b^r$, which may or may not hold. Notice that for $r \leq 1$, the inequality is satisfied. That is, when the CSF is of constant or decreasing returns to scale, it is inferior to the all-pay auction. When $r > 1$, the RHS of the inequality increases in both r and b . Hence, in such a case, given the return to lobbying r , the all-pay auction is preferred to the generalized lottery provided that the stake asymmetry b is sufficiently small. Similarly, given the stake asymmetry b , the all-pay auction is preferred to the generalized lottery provided that the return to lobbying r is sufficiently small. For example, if $r = 1.5$ (recall that $t < 2$) and $b = 2$, then

the generalized lottery function is preferred to the all-pay auction. However, if $b = 1.5$, the opposite result is obtained. We therefore conclude that the all-pay auction is not necessarily preferred to the generalized lottery function. Finally, note that in the rent-seeking literature when the CSF is assumed to be the generalized lottery function, for the sake of simplicity, r is often assumed to be equal to one. Our analysis implies that this assumption makes a significant difference because it raises doubts regarding the plausibility of the assumed CSF that now becomes inferior to the all-pay auction.

4 Summary

We have argued that the CSF, a basic component in contest theory, has a plausible microfoundation. That is, the government random behavior can be rationalized both when it acts randomly, as in the standard influence activities, lobbying or rent-seeking models, or when it acts rationally in setting the agenda (making policy proposals) and randomly in approving or rejecting these proposals. Our argument has been illustrated using the most commonly studied CSFs; the function applied in the analysis of all-pay auctions and two types of logit functions: Tullock's discriminating lottery function and Tullock's generalized lottery function.

In general, when the stakes of the interest groups differ, a necessary condition for preferred randomness is that the weight the government assigns to the contestants' aggregate net payoff is smaller than the weight assigned to the contestants' lobbying efforts. When the weight assigned to the aggregate gross stakes is smaller than the weight assigned to the total lobbying efforts, random behavior is preferred to a certain "no contest" behavior, provided that the contest generates outlays that are larger than the expected difference between the contestants' stakes. We have shown that random behavior can be rationalized if the weight assigned to the lobbying efforts is sufficiently high or stake asymmetry is sufficiently small.

In the special cases of the most commonly studies CSFs, we have obtained three further interesting results: (i) the all-pay auction can be rationalized if the weight assigned to the aggregate gross stakes is smaller than the weight assigned to the total lobbying efforts. (ii) random behavior conforming to a discriminating lottery function is preferred to a certain "no contest" behavior, if the weight assigned to the aggregate gross stakes is smaller than the weight assigned to the total lobbying efforts and the lobbying-skill effectivity of the high-stake contestant is sufficiently high. (iii) The generalized lottery function can be rationalized if the return to lobbying is sufficiently high. Finally, it has been shown that the all-pay auction is always preferred to the discriminating lottery CSF. However, it is not necessarily superior to the generalized lottery CSF. When the generalized CSF is of constant or decreasing returns to scale, it is inferior to the all-pay auction. When the generalized

CSF is of increasing returns to scale, it is inferior to the all-pay auction provided that the stake asymmetry is sufficiently small or the return to lobbying is sufficiently small.

The microfoundation of random government behavior has been provided in a context of lobbying that buys influence, disregarding the possible informational role of lobbying, Grossman and Helpman (2001). Our argument is nevertheless valid in the broader context where lobbying can be of both types. In a more general setting, the rationalization of a lobbying contest and, in particular, of random behavior, can be based not only on the government's interest in extracting resources from the lobbies, but also on its interest in enhancing the aggregate equilibrium well being of the interest groups. When lobbying takes the form of activities that buy influence, it can clearly induce the government to prefer the existence of a contest. When lobbying takes the form of information transmission, it can also induce the government to prefer a contest behavior, because such lobbying can be welfare enhancing, Gradstein (2002), Lagerlof (1997). In such a broader context the effect of the relevant parameters and, in particular, their relative effect on the incentives of the government to prefer the existence of a lobbying contest, certainly deserve a careful study.

The first part of our analysis is confined to the comparison between two options the government faces: a certain "no-contest behavior" and a random "contest behavior" according to one particular CSF. The analysis is then extended to the comparison between a certain "no contest" behavior and random contest behavior that conforms to the most widely used CSFs. These restrictions naturally raise the question: Why do we focus on just these options. One could wonder, in particular, why we confine the analysis to just these CSFs, ignoring the possibility that the government looks for the "reasonable" or the "optimal" CSF? Trying to suggest a workable definition for reasonableness, Skaperdas (1996) supplies axiomatizations for certain CSFs. The search for an optimal CSF has also started. A partial resolution of the problem of an "optimal contest design" is provided in Dasgupta and Nti (1998) and Nti (1997), (2002).^{24,25} One could also wonder what can be said about the comparison between the stylized, reduced-form public-policy contest that was briefly discussed in this chapter and some of the elaborate, political economic models

²⁴ It has been shown that, in two special classes of symmetric logit CSFs, the maximum aggregate lobbying effort is attained, respectively, by a discriminating lottery function and by an all-pay auction with a reservation price. The optimal generalized lottery function has also been identified. Finally, it has been shown that Tullock's constant returns to scale CSF ($r = 1$) is optimal for a risk-neutral contest designer whose valuation for the prize is sufficiently low.

²⁵ For "optimal contest design" in the different context of research and labor tournaments that focus on the adverse selection problem associated with the selection of the most highly qualified contestants in auctions, see Fullerton and McAfee (1999) and the references therein.

that were recently extensively used in the analysis of endogenous public policy. Both of these important issues are beyond the scope of the present chapter, which purports to accomplish the more modest objective of presenting a partial rationalization of random government behavior that conforms to some feasible CSF.

The Extended Contest: With Government

In this part we introduce our first model of endogenous public policy. In Chapter IV we assume that the contest success function (CSF) is of the simple lottery (logit) form proposed by Tullock (1980), $\mathbf{Pr}_i = \frac{x_i}{x_i + x_j}$. By this most popular CSF, a contestant's winning probability is equal to the ratio between his own effort and the total efforts made by the contestants in attempting to win the prize implied by the proposed public policy. We then examine the effect of political culture on relative rent dissipation (RRD) and on the nature of the proposed policy (is it compromise enhancing relative to the policy supported by the interest groups), assuming alternative and more general CSFs.

IV

Endogenous Public Policy

The political economic game that we study fits representative democracies in which public policy is shaped by a two-tier government²⁶ and the affected interest groups. In government there are two levels of decision making. Bureaucrats work out the details of the proposed public policy while elected politicians make the final decision on the approval or rejection of the proposed policy. Our stylized model thus captures the hierarchical nature of the decision-making process and the division of labor in government decision making between bureaucrats and politicians. It takes into account the significant role of the agenda setters as well as the important role of the actual decision makers, the politicians. The dichotomous nature of the decisions made by the politicians (approve or reject) and the dual nature of the public decision-making process that consists of *certain* proposals and *uncertain* approval of these proposals are also taken into account.

The endogenously determined public policy is part of the equilibrium outcome of the extended game. The other components of the equilibrium outcome are the lobbying efforts made by the interest groups trying to affect the realized policy in their favor. The extended game has two stages. In the first one a bureaucrat proposes a policy.²⁷ In the second stage the other two players, the interest groups, compete for or against the approval of the proposed policy

²⁶ Endogenous policy models usually neglect the fact that public policy is often the outcome of decisions made by, both, elected politicians and bureaucrats. See, however, Hoyt and Toma (1989), Mazza and van Winden (1999) and Swank, Letterie and van Dalen (1999) who analyze public policy determination using alternative models of two-tier decision-making bodies.

²⁷ The professional office holder may propose a detailed policy in response to the request and possibly the guidelines of the ruling politician. In some instances, the implementation of the proposed policy requires only the endorsement of the ruling politician (the relevant agent in the executive branch – the prime minister, the minister of finance, etc.). If, however, endorsement by the legislature is also required, then we have to assume that the ruling politician has a secured majority in the legislature that ensures its support in the proposed economic policy.

by the elected politician. The second-stage subgame is the standard Tullock-type rent-seeking rent-avoidance contest presented in Part A. In this contest the interest groups compete on the benefits associated with the approval or rejection of the proposed policy, expending resources that are (partly) received by the ruling politician.

The bureaucrat, whose objective function reflects his and the ruling politician's preferences, is assumed to be a leading player. In this respect our approach resembles that of Appelbaum and Katz (1987) and Kohli and Singh (1999). In fact, the bureaucrat anticipates the political activity that determines whether his proposed policy is approved. That is, he is aware of the relationship between the contest outcome and the proposed policy.

The politician and the bureaucrat are not necessarily extreme rent seekers. Depending on the political culture, they can also care about the enhancement of the aggregate welfare of the interest groups. The objective function of the bureaucrat reflects his commitments to the ruling politicians, to the public and to his narrow self-interest. Indirectly, therefore, although the behavior of the politician is not modeled explicitly, his preferences take part in the determination of the proposed policy. The bureaucrat's objective function hinges on a single parameter: the weight assigned to social welfare relative to the total rent-seeking or lobbying outlays. This parameter represents the political culture or the degree of politicization of the government.^{28,29} Our analysis in this chapter focuses on the effect of changes in the degree of politicization on the proposed public policy and, in turn, on the lobbying efforts of the interest groups and their expected welfare. The main result establishes that increased politicization, namely, a reduction in the weight assigned by the government to social welfare, need not result in reduced social welfare. In an uncertain political economic environment, the natural intuitive claim that reduced politicization is socially advantageous is not necessarily valid. Interestingly, increased benevolence of the government can be socially undesirable.

The following examples illustrate the public-policy contest that we study. A tax reform proposed by a bureaucrat may be supported by one industry

²⁸ The composite utility function of our bureaucrat does not assign political influence or political power weights to the interest groups. For a survey of models where the government maximizes this latter type of composite utility function, see van Winden (1999).

²⁹ Our model is related to the recent literature on optimal contest design. While in that literature the designer is concerned only with aggregate rent-seeking outlays, Baye, Kovenock and de Vries (1993), Dasgupta and Nti (1998), in our setting he may have broader objectives. While in that literature the designer controls the allocation of a fixed prize between a number of contests, the sequence of contests, Gradstein and Konrad (1999), Gradstein (1998), admittance to a contest, Baye, Kovenock and de Vries (1993), the number of contestants Amegashie (1999), or the allocation of a fixed budget between private good and public good rents, Nitzan (1994), in our setting the designer controls the players' payoffs by setting the proposed public policy.

and opposed by another. Existing pollution standards may be defended by the industry and challenged by an environmentalist interest group. A monopoly can face the opposition of a customers coalition fighting for appropriate regulation. Capital owners and a workers union can be engaged in a contest that determines the minimum wage, and so on. Two examples from US politics that illustrate our setting are the congressional reviews of late-term Clinton administration actions on ergonomics and environmental regulations on land use in national forests. Both regulations were reviewed and criticized by the new Congress, and both could have been squelched. But the ergonomics regulations (a decade in the making) were overturned under the Congressional Review Act of 1996, while the environmental regulations were allowed to stand. The explanations for these outcomes can be traced to the strength of the interest groups supporting the regulations (organized labor and the environmental lobby, respectively), that is, to their exerted efforts (fighting, lobbying or rent-seeking efforts), that depend, in turn, on the parameters of the contest and, in particular, on the contestants' payoffs in the event that the public-policy proposal is approved or rejected.

1 The Public-policy Game

In our public-policy game there are three players. The first one is the bureaucrat who proposes a policy that along with the status quo constitutes the agenda. His proposal is approved or rejected by an elected politician who often initiates the submission of the proposal and even gives the bureaucrat some general guidelines. The other players are the two interest groups that are affected differently by the approval or rejection of the proposed policy. In general, one group derives a higher benefit than the other from the realization of its preferred policy. One player is referred to as the low-benefit (LB) player and the other player is called the high-benefit (HB) player. The interest groups engage in a standard Tullock-type rent-seeking contest that determines the probabilities of approval and rejection of the proposed policy.³⁰

The interest groups make their decisions given: (a) the value of the policy instrument set by the planner, I and (b) the contest success function, (CSF) that specifies the probability of approval of the proposed policy corresponding to the rent-seeking efforts of the interest groups. The ruling politician affects the outcome of the contest by being responsible for the existence of the contest, and, in particular, for the specific contest success function that characterizes it. Note that although his behavior is not modeled and he is just posited to respond to the pressure of the interest groups, the politician's preferences

³⁰ Modeling the rent seekers as single agents presumes that they have already solved the collective action problem. The model thus applies to already formed interest groups.

1: The Bureaucrat

Sets the agenda by
proposing an
alternative to the
status quo policy I :
 $I \in [\underline{I}, \bar{I}]$



2: The Interest Groups

Simultaneously select the
rent-seeking and rent-avoidance
expenditures



Probabilities of
approval and rejection
of the proposed policy and,
in turn, the expected
payoffs of the contestants

Expected net payoffs
of the interest group



The value of the
bureaucrat's objective
function that depends
on the contestants'
expenditures and the sum
of their expected payoffs

Fig. B.1. Game Structure

affect the policy selected by the bureaucrat because the latter's objective function is partly determined by the politician's preferences.³¹

Figure B.1 describes the structure of the public-policy game.

a The Contest Between the Interest Groups

As presented in Sect. III.1, with probability $0 \leq \Pr_L \leq 1$ the ruling politician approves the preferred policy of the LB player. The present discounted value of

³¹ The guidelines issued by the politician may affect the bureaucrat's feasible set of policy proposals and therefore his chosen proposal.

this policy to this player is equal to u_L and the value to the HB player is equal to v_H . With probability $0 \leq \Pr_H \leq 1$ the ruling politician decides in favor of the other party, i.e. the HB player. In this case the present discounted values to the LB and the HB players are equal, respectively, to v_L and u_H . Note that, in general, the above four values, viz., the players' payoffs corresponding to the approval and rejection of the proposed policy depend on I . These payoffs determine the rents, the transfers and the deadweight losses associated with I . Government intervention may imply the creation of rents for one player only, transfers from one player to the other or the award of some rent to one player accompanied by some loss to the other. The reduction in the payoff of one agent may exceed the rent awarded to the other agent. The difference between the payoff (the rent) for one player and the loss to the other player typically represents the deadweight loss or the efficiency gain associated with the implementation of the proposed policy I . The deadweight loss can be negative. In such a case government intervention is justified, that is, I represents some corrective policy that improves the allocation of resources in the economy. As defined earlier, x_L and x_H are the rent-seeking expenditures or outlays of the LB and the HB risk-neutral players. The expected net payoffs are defined as in by Eq. (A.1). Using our notation for the possible policy values for the LB and the HB players, these expected net payoffs are given, respectively, by:

$$E(w_L) = \Pr_L u_L(I) + \Pr_H v_L(I) - x_L, \quad (\text{B.1})$$

and

$$E(w_H) = \Pr_H u_H(I) + \Pr_L v_H(I) - x_H. \quad (\text{B.2})$$

We assume that u_i and v_i (for $i = L, H$) are continuous and twice differentiable in I . Moreover, it is assumed that $u_H(I) > v_H(I)$ and $u_L(I) > v_L(I)$. This assumption simply requires that for each player approval of his preferred policy is associated with a positive payoff. The probabilities $\Pr_L$ and $\Pr_H$ are obtained by Tullock's (1980) commonly used nondiscriminating simple lottery CSF. That is, player i 's probability of success in competing against player j is given by:³²

$$\Pr_i = \Pr_i(x_i, x_j) = \frac{x_i}{x_i + x_j} \quad \forall i \neq j, \quad x_i, x_j > 0. \quad (\text{B.3})$$

It is clear from the structure of the game that both players participate in the contest with positive values of x_i and that one of them wins the contest. We therefore focus on the interior Nash equilibria of the contest. The conditions

³² The results are robust with respect to the family of CSF that satisfy:

$$\Pr_w(x_w, x_p) = \frac{dh(x_w)}{dh(x_w) + h(x_p)} \quad \text{where} \quad \frac{\partial h(y)}{\partial y} > 0 \quad \forall y = x_m, x_p.$$

characterizing an interior equilibrium of the contest are:³³

$$\frac{\partial E(w_j)}{\partial x_j} = 0, \quad \text{for } j = H, L.$$

From Eqs. (A.8) and (A.9), the equilibrium rent-seeking outlays and the players' probabilities of winning the contest are given by:

$$\begin{aligned} x_L^* &= \frac{(n_L(I))^2 n_H(I)}{(n_H(I) + n_L(I))^2} & \text{and} & & x_H^* &= \frac{(n_H(I))^2 n_L(I)}{(n_L(I) + n_H(I))^2} \\ \text{Pr}_L^* &= \frac{n_L(I)}{n_L(I) + n_H(I)} & \text{and} & & \text{Pr}_H^* &= \frac{n_H(I)}{n_L(I) + n_H(I)} \end{aligned} \quad (\text{B.4})$$

where $n_L = (u_L - v_L)$ and $n_H = (u_H - v_H)$ denote the LB and the HB players' stakes (their benefit from winning the contest). The stake can be the rent or the avoided loss. It is secured when a player wins the contest, that is, when his preferred policy is the outcome of the contest (For one player this desirable outcome is associated with the approval of the proposed policy and for the other player it is associated with its rejection).

From Eq. (B.4), we directly obtain that the player with the higher stake invests more resources in rent-seeking activities and has a greater probability of winning the contest.³⁴ The relative probabilities of winning the contest and the relative equilibrium rent-seeking expenditures of the players are obtained from Eqs. (B.3) and (B.4),

$$\frac{\text{Pr}_L^*}{\text{Pr}_H^*} = \frac{x_L^*}{x_H^*} = \frac{n_L^*(I)}{n_H^*(I)}. \quad (\text{B.5})$$

That is, in equilibrium, the players' relative probabilities of winning the contest are equal to their relative rent-seeking expenditures and to their relative stakes.³⁵

In general, one of the rent seekers has an advantage over the other in terms of his benefit from winning the contest. Without loss of generality, we therefore assume that $n_L < n_H$.

³³ From Eq. (A.7), the sufficient (second-order) conditions of such equilibria are satisfied,

$$\frac{\partial^2 E(w_j)}{\partial x_j^2} = \frac{-2x_k}{(x_k + x_j)^3} (u_j(I) - v_j(I)) < 0, \quad \text{for } k \neq j \quad \text{and } k, j = H, L.$$

³⁴ The probability of the socially more efficient outcome of the contest is higher than the probability of the less efficient outcome. For a similar result see Baik (1994a) and Nti (1999). This type of efficiency criterion has been used by Becker (1983), Ellingsen (1991), Fabella (1995) and, more recently, by Hurley and Shogren (1998). The expected aggregate payoff of the players is a more plausible efficiency criterion that is examined in the following.

³⁵ For a similar result see Nti (1998) and Epstein and Nitzan (2003b).

The following conditions play a significant role in our subsequent analysis.

- (i): $n'_H = \frac{\partial n_H}{\partial I} > 0$ and $n'_L = \frac{\partial n_L}{\partial I} < 0$ for $I \in [L, \bar{I}]$.
- (ii): $n'_H = \frac{\partial n_H}{\partial I} < 0$ and $n'_L = \frac{\partial n_L}{\partial I} > 0$ for $I \in [L, \bar{I}]$.
- (iii): $n'_H = \frac{\partial n_H}{\partial I} > 0$ and $n'_L = \frac{\partial n_L}{\partial I} > 0$ for $I \in [L, \bar{I}]$.
- (iv): $n'_H = \frac{\partial n_H}{\partial I} < 0$ and $n'_L = \frac{\partial n_L}{\partial I} < 0$ for $I \in [L, \bar{I}]$.

The above conditions capture the four possible combinations of public-policy effects on the stakes of the interest groups. Conditions (i) and (ii) imply that a change in the policy instrument I has opposite effects on the stakes of the two players. Condition (iii) and (iv) imply that a change in I has a similar positive (negative) effect on the stakes of the players. The following example illustrates the applicability of the model.

b Example: Public-good Provision

The government is considering building a park on the outskirts of a residential neighborhood. To finance the project, a general tax is levied on all the country residents who potentially benefit from the provision of the proposed park. In addition to the financial tax, the local residents living close to the park are subjected to another form of “tax”: the negative externalities (increased congestion, noise, etc.) associated with being in the vicinity of a public park attracting a large number of visitors all year round. Suppose that the government’s policy instrument is the countrywide tax. We consider three possible cases:

- (1) The taxes collected are allocated to building the park. An increase in the lump-sum tax or in the tax rate implies an increase in the size of the park. Suppose this raises the benefit to the nonlocal residents, but reduces the benefit to the local residents. In this case, who the LB and the HB players are is not clear. However, the larger the park, the more the nonlocal residents benefit from approval of the proposed tax and, in turn, from the park. The benefit to the local residents from the rejection of such a proposal increases with the tax level and, in turn, with the size of the park. Condition E(iii) holds.
- (2) Although increased taxes imply a larger park, we now assume that the benefit to the general public is not affected beyond a certain size. In such a case, a tax increase and, in turn, a larger park may reduce the benefit associated with the approval of the proposed tax change to the nonlocal residents, while increasing the net benefit associated with its rejection to the local residents. In such a case, either condition E(i) or condition E(ii) holds.
- (3) Suppose that the collected tax is used to finance the park as well as to compensate the local residents for the negative externalities. In such a case it is possible that increasing the proposed tax reduces both the benefit associated with its rejection for the local residents and with its approval for the nonlocal residents. Condition E(iv) may, therefore, hold.

c Public Policy and Rent-seeking Outlays

From Eq. (A.10), we know that in equilibrium the total rent-seeking outlays are given by

$$X^* = x_L^* + x_H^* = \frac{n_L(I)n_H(I)}{n_L(I) + n_H(I)}. \quad (\text{B.6})$$

The effect of a change in the public-policy instrument I on the total rent-seeking outlays is ambiguous

$$\frac{\partial X^*}{\partial I} = \frac{n_H(I)n_L(I)n'_H(I)}{(n_H(I) + n_L(I))^2} \left(\frac{\eta_L}{\eta_H} + \frac{n_L(I)}{n_H(I)} \right), \quad (\text{B.7})$$

where

$$\eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j} = n'_j \frac{I}{n_j}$$

is the elasticity of player j 's stake with respect to a change in the proposed policy instrument I . From Eq. (B.7), we obtain general conditions that determine the effect of a change in the policy instrument on the equilibrium total rent-seeking expenditures. Specifically

Proposition B1: *Let $I \in [\underline{I}, \bar{I}]$. Then*

- i. Under (i), $\frac{\partial X^*}{\partial I} < 0$ if $\frac{-\eta_L}{\eta_H} > \frac{n_L(I)}{n_H(I)}$.*
- ii. Under (ii), $\frac{\partial X^*}{\partial I} > 0$ if $\frac{-\eta_L}{\eta_H} > \frac{n_L(I)}{n_H(I)}$.*
- iii. Under (iii), $\frac{\partial X^*}{\partial I} > 0$.*
- iv. Under (iv), $\frac{\partial X^*}{\partial I} < 0$.*

Notice that, by Proposition B1(i), $-\eta_L > \eta_H$ is a *sufficient* condition for the total rent-seeking outlays to be inversely related to I and, by Proposition B1(ii), $-\eta_L < \eta_H$ is a sufficient condition for the total rent-seeking outlays to be inversely related to I .

d The Government: Bureaucrats and Politicians

Following the discussion presented in Sect. A.III, the government in this study consists of the ruling politician and the bureaucrat. The latter proposes the policy instrument $I, I \in [\underline{I}, \bar{I}]$, which is then approved or rejected by the

ruling politician.³⁶ When working out a policy proposal the bureaucrat anticipates the political activity that determines whether his proposal is approved. He thus takes into account the relationship between his proposed policy and the equilibrium outcome in the rent-seeking contest between the LB and HB players. From his point of view this relationship is conceived as a political constraint. His action is affected by his commitments to the ruling politician and to the public interest. These commitments are represented by his specific objective function that may allow complete independence of the ruling politician (complete dedication to the enhancement of social welfare), complete dependence on the ruling politician and intermediate cases of mixed commitments to the ruling politician and to the public interest. His objective function $G(\cdot)$ depends therefore on the total rent-seeking outlays and on the expected net payoffs of the interest groups, $E(w_L)$ and $E(w_H)$. Social welfare depends on the sum of the interest groups' rent-seeking rent-avoidance outlays and on their expected net payoffs. The sum of these payoffs is referred to as social welfare. Our definition of social welfare is plausible provided that the active interest groups represent all relevant interests in society. The total rent-seeking outlays ($x_L + x_H$) represent either transfers to the ruling politician or wasteful resources. The ruling politician's utility is increasing in the fraction of the rent-seeking outlays transferred to him. His utility may also depend on social welfare being either benevolent or a realistic politician who wishes to be re-elected.³⁷

Let us denote by $\bar{E}(w_L^*)$ and $\bar{E}(w_H^*)$ the equilibrium expected payoffs of the LB and HB players. That is, $\bar{E}(w_L^*)$ and $\bar{E}(w_H^*)$ are the players' equilibrium expected payoffs when their rent-seeking expenditures are disregarded, $E(w_L^*) = \bar{E}(w_L^*) - x_L^*$ and $E(w_H^*) = \bar{E}(w_H^*) - x_H^*$. Usually, to some extent the bureaucrat is committed to the ruling politician as well as to the enhancement of social welfare. As in Eq. (A18), we assume that his objective function is of the following additive form that reflects these mixed commitments.

$$G(\cdot) = \alpha g(\bar{E}(w_L^*) + \bar{E}(w_H^*)) + (1 - 2\alpha)f(x_H^* + x_L^*), \quad (\text{B.8})$$

where $0 \leq \alpha \leq 1$.

³⁶ In our model the bureaucrat does not have a second chance in the sense that he can only once present a public-policy proposal, and the ruling politician approves or rejects this proposal with no option of amendment. We do not allow the possibility of a repeated game in which the bureaucrat can change the proposed policy after it is rejected by the ruling politician.

³⁷ Another shortcoming of our definition of social welfare is its disregard of various possible general-equilibrium-type effects on social welfare of the equilibrium outcome in our contest. For example, the resources expended in the public-policy contest may affect the outcome in other contests that our two interest groups and other interest groups may care about. In order to focus our discussion, we assume that the impact on social welfare of such general-equilibrium-type effects is negligible.

The weight $(1 - 2\alpha)$ determines whether the second expression in the bureaucrat's objective function is a positive or a negative welfare component. A negative weight implies that the total rent-seeking outlays are considered as wasteful resources. $g(\cdot)$ and $f(\cdot)$ are monotone increasing functions that specify the utility components corresponding to the aggregate expected payoff of the public and to the total rent-seeking outlays. The bureaucrat's mixed commitments to the public and to the ruling politician that depend on the political culture are thus represented by α . The term $(1 - 2\alpha)$ represents the degree of politicization of the government. The weight α reflects the allocation of the contestants' expenditures between wasteful resources, nonwasteful resources transferred to the incumbent ruling politician and nonwasteful resources transferred to the bureaucrat. It also reflects the commitments of the ruling politician to the public interest and to his narrow self-interest, namely, to collecting the contestants' rent-seeking expenditures. Finally, it also reflects the commitments of the bureaucrat to the public interest, to the ruling politician and to his narrow interest of controlling resources expended by the contestants. The objective function $G(\cdot)$ can represent a broad spectrum of political cultures, namely patterns of mixed commitments of bureaucrats and politicians as well as allocations of the total rent-seeking outlays between the wasteful and nonwasteful components.³⁸

To illustrate the general applicability of the assumed objective function, we consider several special cases where α ranges between 0 and 1:

When $\alpha = 1$ ($1 - 2\alpha = -1$) the bureaucrat is committed to the public interest, and the completely wasteful rent-seeking outlays are conceived as total loss to society. When $\alpha = 0.5$ ($1 - 2\alpha = 0$) the bureaucrat is again totally committed to the public interest. He disregards, however, the total rent-seeking outlays because they constitute a transfer from the LB and the HB players to the government that is redistributed back to the public. When $\alpha = 1/3$ ($1 - 2\alpha = 1/3$) the nonwasteful rent-seeking outlays are transferred to the government and the bureaucrat assigns equal weights to his utility components depending on the rent-seeking outlays and on the aggregate expected payoff of the interest groups. When $\alpha = 0$ ($1 - 2\alpha = 1$), the objective of the bureaucrat is to maximize the rent-seeking outlays disregarding social welfare. This objective function represents an extreme political culture where the bureaucrat is totally committed to his and/or to the ruling politician's narrow interest of controlling the resources expended by the rent seekers.

³⁸ Note that since

$$\bar{E}(w_i^*) = E(w_i^*) + x_i^*, \quad \text{if } f(y) = g(y) = y,$$

then Eq. (B.8) can be rewritten as

$$G(\cdot) = \alpha (E(w_L^*) + E(w_H^*)) + (1 - \alpha) (x_L^* + x_H^*) .$$

In this case α and $(1 - \alpha)$ are the weights assigned, respectively, to the expected social welfare and to the total rent-seeking outlays.

All other intermediate cases are obtained when $0 < \alpha < 1, \alpha \neq 1/2, \alpha \neq 1/3$. When the rent-seeking activities positively affect the bureaucrat's objective function, $0 < \alpha < 0.5$. When the rent-seeking activities negatively affect the bureaucrat's objective function, $0.5 < \alpha < 1$.

2 Politicization and Welfare

When making the decision regarding the optimal level of the policy instrument, the bureaucrat maximizes $G(\cdot)$ taking into account the equilibrium rent-seeking outlays corresponding to the different levels of his control variable I . The first-order condition that characterizes an interior solution of his problem is:³⁹

$$\frac{\partial G(\cdot)}{\partial I} = \alpha \frac{\partial g(\bar{E}(w_L^*) + \bar{E}(w_H^*))}{\partial I} + (1 - 2\alpha) \frac{\partial f(x_L^* + x_H^*)}{\partial I} = 0 \quad (\text{B.9})$$

or

$$\begin{aligned} & \frac{\partial g(\bar{E}(w_L^*) + \bar{E}(w_H^*))}{\partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))} \frac{\partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))}{\partial I} \\ &= - \frac{(1 - 2\alpha)}{\alpha} \frac{\partial f(x_L^* + x_H^*)}{\partial (x_L^* + x_H^*)} \frac{\partial (x_L^* + x_H^*)}{\partial I}. \end{aligned} \quad (\text{B.10})$$

Given that in our two-stage game the bureaucrat is a leading player, we refer to (x_L^*, x_H^*, I^*) as the Stackelberg–Nash equilibrium of the public-policy game. The interior equilibrium is given by Eq. (A.8) and the solution of Eq. (B.10).

To examine the welfare effect of a change in the degree of politicization of the government, let us first examine the effect of a change in the parameter α on the equilibrium policy proposal I^* . It can be verified that

$$\frac{\partial I^*}{\partial \alpha} = \frac{-\partial^2 G(\cdot)/\partial I \partial \alpha}{\partial^2 G(\cdot)/\partial I^2}.$$

By the second-order condition,

$$\frac{\partial^2 G(\cdot)}{\partial I^2} < 0.$$

³⁹ By the second-order condition,

$$\frac{\partial^2 G(\cdot)}{\partial I^2} = \alpha \frac{\partial^2 g(\bar{E}(w_L^*) + \bar{E}(w_H^*))}{\partial I^2} + (1 - 2\alpha) \frac{\partial^2 f(X^*)}{\partial I^2} < 0.$$

Using the first-order conditions, we therefore get that the derivative $\frac{\partial I^*}{\partial \alpha}$ and the derivative $\frac{\partial X^*}{\partial I}$ have opposite signs. To sum up,

Proposition B2:

- (a) $\text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right) = -\text{Sign} \left(\frac{\partial X^*}{\partial I} \right),$
 (b) $\frac{\partial X^*}{\partial \alpha} < 0.$

Using Proposition B1, we can directly specify the conditions that determine the sign of $\left(\frac{\partial I^*}{\partial \alpha} \right)$. The above proposition emphasizes the critical significance of the sensitivity of X^* to variations in public policy in determining the sensitivity of the optimal policy I^* to the parameter α . In any event, increased politicization (a decline in α) induces larger rent-seeking outlays.

Assuming that the rent-seeking outlays are wasted resources,⁴⁰ the expected social welfare in equilibrium is given by:

$$E(U^*) = \bar{E}(w_L^*) + \bar{E}(w_H^*) - X^*. \quad (\text{B.11})$$

The sensitivity of $E(U^*)$ to a change in the policy instrument I is given by:

$$\frac{\partial E(U^*)}{\partial I^*} = \frac{\partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))}{\partial I^*} - \frac{\partial X^*}{\partial I^*}. \quad (\text{B.12})$$

From Eq. (B.10), we get that

$$\frac{\partial E(U^*)}{\partial I^*} = -\frac{(1-2\alpha)}{\alpha} \frac{\partial f / \partial X^*}{\partial g / \partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))} \frac{\partial X^*}{\partial I^*} - \frac{\partial X^*}{\partial I^*}. \quad (\text{B.13})$$

We thus obtain

Lemma B1: *If $\alpha > 1/2$ and $-(1-2\alpha) \frac{\partial f(\cdot)}{\partial X^*} > \alpha \frac{\partial g(\cdot)}{\partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))}$,*

$$\text{Sign} \frac{\partial E(U^*)}{\partial I^*} = \text{Sign} \frac{\partial X^*}{\partial I^*}.$$

Otherwise,

$$\text{Sign} \frac{\partial E(U^*)}{\partial I^*} = -\text{Sign} \frac{\partial X^*}{\partial I^*}.$$

The effect of a change in the policy instrument on the expected social welfare is ambiguous. By lemma B1 and Proposition B1, the welfare effect of I depends

⁴⁰ The results of this subsection are still valid under the assumption that some of the rent-seeking efforts are not wasted.

on the degree of politicization $(1 - 2\alpha)$, the functions $f(\cdot)$ and $g(\cdot)$, and the stakes $n_L(I)$ and $n_H(I)$. The first three parameters, α , f and g , determine whether the sign of the welfare effect of a change in I is equal to the sign of the rent-seeking effect of such a change. The last two parameters, the stakes, determine the sign of the rent-seeking effect of a change in I . If the two conditions in Lemma B1 are satisfied, then the signs of the effects of a change in the policy instrument I on the expected social welfare and on the total rent-seeking outlays are equal. Otherwise the two effects have different signs.

Let us finally examine the effect of a change in the weight α on the expected social welfare. Since

$$\frac{\partial E(U^*)}{\partial \alpha} = \frac{\partial E(U^*)}{\partial I^*} \frac{\partial I^*}{\partial \alpha}, \quad (\text{B.14})$$

we get that

$$\text{Sign} \left(\frac{\partial E(U^*)}{\partial \alpha} \right) = \text{Sign} \left(\frac{\partial E(U^*)}{\partial I^*} \right) \text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right). \quad (\text{B.15})$$

By Lemma B1 and Proposition B2, we obtain

Proposition B3: *If $\alpha > 1/2$ and $-(1 - 2\alpha) \frac{\partial f(\cdot)}{\partial X^*} > \alpha \frac{\partial g(\cdot)}{\partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))}$,*

$$\text{Sign} \left(\frac{\partial E(U^*)}{\partial \alpha} \right) = \left(-\text{Sign} \left(\frac{\partial X^*}{\partial I^*} \right) \right) \left(-\text{Sign} \left(\frac{\partial X^*}{\partial I^*} \right) \right) < 0.$$

Otherwise,

$$\text{Sign} \left(\frac{\partial E(U^*)}{\partial \alpha} \right) = \left(-\text{Sign} \left(\frac{\partial X^*}{\partial I^*} \right) \right) \left(-\text{Sign} \left(\frac{\partial X^*}{\partial I^*} \right) \right) > 0.$$

Increased politicization is usually considered harmful to social welfare. Indeed, under certainty conditions the more politicized the government, the less efficient is the outcome of its intervention. In our uncertain political economic environment, the two conditions stated in Proposition B3 ensure that increased politicization (a decline in α) is socially advantageous. Such a decline increases the wasteful resources expended by the interest groups. This increase that negatively affects the expected payoff of the interest groups is more than counterbalanced by the corresponding increase in the gross expected payoff. The intuition behind this possibility of welfare-enhancing increased politicization is as follows. The first condition, $\alpha > 1/2$, implies that $(1 - 2\alpha) < 0$, that is, the rent-seeking outlays X^* have a negative net impact on the bureaucrat's objective function. The second condition,

$$-(1 - 2\alpha) \frac{\partial f(\cdot)}{\partial X^*} > \alpha \frac{\partial g(\cdot)}{\partial (\bar{E}(w_L^*) + \bar{E}(w_H^*))},$$

ensures that, in equilibrium, the marginal effect of a change in the rent-seeking outlays on the bureaucrat's objective function is larger than the marginal effect of a change in the gross expected welfare of the interest groups. A decline in α results in a change in the optimal I . Given the above second condition, to satisfy the first-order condition Eq. (B.10), the required increase in the gross expected welfare of the interest groups must be larger than the resulting increase in the rent-seeking outlays. By definition, see Eq. (B.11), this means that the expected social welfare is increased. The increase in the degree of politicization ($1 - \alpha$) changes the proposed policy I and the stakes n_H and n_L and, by Proposition B2(b), increases X^* . The change in the rent-seeking outlays of the interest groups, x_H and x_L , also affects their probabilities of winning the contest. The increase in X^* reduces the expected social welfare. However, when the above two conditions are satisfied, the changes in the winning probabilities and in the stakes of the interest groups increase the gross expected payoff of one group or of both groups such that the increase in the gross expected welfare of the interest groups exceeds the increase in their rent-seeking outlays and, therefore, the expected social welfare increases.

Public policy has different implications for different interest groups. Consequently, such groups make efforts to influence the policy. The resources expended by the interest groups that try to influence the proposed policy in their favor are referred to as rent-seeking outlays. The complex public-policy decision-making process typically involves two stages: (i) the proposal of public policy by bureaucrats (professional office holders, regulators, economic planners, etc.) possibly in response to the initiative and some guidelines of the ruling politicians and (ii) the approval or rejection of the proposed policy by the elected politicians. The politician issuing the guidelines may assign similar or different weights to social welfare and to the aggregate outlays of the contestants relative to the bureaucrat. Certainly, there is legislative impact on the bureaucrat's choices (there exists a large political science literature on bureaucratic discretion, see Epstein and O'Halloran (1999) and references therein). In our model, the guidelines, which are not endogenous, may constrain the bureaucrat's feasible set of policy proposals. Given that set, we examine the effects of a change in the level of politicization of the government.

The political pressures exerted by the interest groups are directed to the ruling politicians. These politicians as well as the bureaucrats are, in general, concerned with social welfare (the public interest), but also with a narrow self-interest, viz., collecting the rent-seeking outlays expended by the interest groups. In this chapter we use a stylized political economic model of endogenous public-policy determination to study the welfare implications of a change in the degree of politicization of the government. Our main result is that in an uncertain political economic environment reduced politicization is not necessarily welfare enhancing. The conditions giving rise to this possibility are stated in Proposition B3. The first condition requires that the rent-seeking outlays adversely affect the objective function of the bureaucrat. The second

condition requires that the negative effect of a marginal change in the rent-seeking outlays on the objective function is stronger than the positive effect of a marginal change in the expected gross payoff of the interest groups.⁴¹ The welfare effect of transforming a rent-seeking contest to a rent-seeking rent-avoidance contest by introducing an interest group that opposes the award of the rent is ambiguous (see Baik (1999), Ellingsen (1991) and Schmidt (1992) in which this result is established in the context of monopoly regulation). Our main result implies that a marginal change in the political culture, namely, a marginal change in the degree of politicization of the government, has ambiguous welfare implications. This finding implies that the frequently raised claims regarding the “evil” of politicization should be taken with care.

3 Stakes and Welfare

A major concern in the rent-seeking literature has been the issue of how do changes in the parameters of a Tullock (1980) contest affect the equilibrium rent-seeking efforts and the extent of rent dissipation, see Baik (1994b). In particular, attention has been paid to the effect of changes in the valuations of the rent seekers, Baik (1994a), Gradstein(1995), Hillman and Riley (1989) and Nti (1999). The latter study established that the expected payoff of a player increases with his own valuation, but decreases with the valuation of the competitor. This implies that the effect of a change in a player’s valuation of the rent on the aggregate expected payoff is ambiguous. The main purpose of this section is to resolve this ambiguity within our public-policy contest. We therefore focus our analysis on the effect of changes in the two contestants’ valuations in the two possible outcomes of the public-policy contest on social welfare – the aggregate expected payoff of the interest groups.

Recently, Nti (1999) has derived comparative statics results for Tullock rent-seeking contest with asymmetric valuations. In particular, he proves that the expected payoff of a player is positively related to his own valuation but is inversely related to the valuation of his opponent (Proposition 5 in Nti (1999)). Hence, the effect of a change in a player’s valuation on the aggregate

⁴¹ In our model, the lobbying efforts of the interest groups are directed to the politicians and not to the bureaucrat. Alternatively, the interest groups can lobby the bureaucrat directly in order to influence his proposed policy. In general, the interest groups may wish to influence both the proposed policy and the probability of its approval and therefore allocate their lobbying efforts between the bureaucrat and the ruling politician. In such alternative lobbying models, as long as the proposed policy or the approval of the proposed policy remain uncertain from the viewpoint of the interest groups, the main result of the present study is basically preserved. Uncertainty regarding the contest outcome together with appropriate mixed commitments of the bureaucrat to the ruling politician and to the enhancement of social welfare are the two key characteristics necessary for the derivation of the main result of this chapter.

expected payoff of the players is ambiguous. In our extended public-policy application of a Tullock game the valuations of the two interest groups are equal to their stakes. Hence, by Nti's result, a change in one of our four valuation parameters, which affects one of the stakes, is beneficial to one player but harmful to the other player. In our setting, however, the welfare effect of a change in three of the valuation parameters is unequivocal. A change in the fourth valuation parameter is ambiguous. We resolve this ambiguity by providing the condition that determines whether the expected aggregate payoff is positively or negatively related to this valuation parameter. Assuming that the rent-seeking outlays are wasted resources,⁴² the expected social welfare in equilibrium is given by

$$E(U^*) = \bar{E}(w_L^*) + \bar{E}(w_H^*) - X \quad (\text{B.16})$$

$$= \left(\frac{n_L}{n_H + n_L} (u_L + v_H) + \frac{n_H}{n_L + n_H} (u_H + v_L) \right) - \frac{n_H n_L}{n_L + n_H}.$$

The effects of changes in the four possible valuation parameters of the two players on their aggregate expected payoff are given by:

$$\frac{\partial(E(U^*))}{\partial u_L} = \frac{(n_L - n_H)(n_L + n_H) - n_H(n_H - 2n_L)}{(n_L + n_H)^2}, \quad (\text{B.17})$$

$$\frac{\partial(E(U^*))}{\partial u_H} = \frac{(n_H - n_L)(n_H + n_L) - n_L(n_L - 2n_H)}{(n_L + n_H)^2} > 0, \quad (\text{B.18})$$

$$\frac{\partial E(U^*)}{\partial v_L} = \frac{2n_H^2}{(n_L + n_H)^2} > 0, \quad (\text{B.19})$$

and

$$\frac{\partial E(U^*)}{\partial v_H} = \frac{2n_L^2}{(n_L + n_H)^2} > 0. \quad (\text{B.20})$$

We directly obtain,

Proposition B4:

- (i) $\frac{\partial E(U^*)}{\partial u_L} > 0$ if $\frac{n_L}{n_H} > \sqrt{3} - 1 \approx 0.732$
- (ii) $\frac{\partial E(U^*)}{\partial u_H} > 0$.
- (iii) $\frac{\partial E(U^*)}{\partial v_L} > \frac{\partial E(U^*)}{\partial v_H} > 0$.

⁴² The results are still valid under the assumption that some of the rent-seeking efforts are not wasted.

By this Proposition, the effect of a change in u_L on the expected social welfare is ambiguous. The reason for this ambiguity is that a change in u_L has two contrasting effects on the expected social welfare. On the one hand, an increase in u_L increases the LB player's stake and in turn, it directly increases his expected payoff and, in turn, the expected social welfare. On the other hand, such an increase in u_L increases the LB player's probability of winning the contest and, therefore, it tends to reduce the expected social welfare. The net effect is therefore ambiguous. If, however, the stake of the LB player is sufficiently close to the stake of the HB player ($n_L/n_H > 0.732$), then social welfare is positively related to a change in u_L . In contrast, the effect of a change in u_H , v_L or v_H on the expected social welfare is positive. An increase in u_H increases the HB player's stake as well as his probability of winning the contest. The resulting increase in his expected payoff more than counterbalances the decline in the expected payoff of the LB player, which is due to the decline in his probability of winning the contest. The expected social welfare is therefore increased. A similar situation occurs when v_L or v_H change. For example, an increase in v_L increases the HB player's expected payoff because of the increase in his probability of winning the contest. This increase more than counterbalances the decline in the expected payoff of the LB player, which is due to the decline in his stake and the decline in his probability of winning the contest. Aggregate expected welfare is therefore increased.

In our two-interest group public-policy contest the players' valuations are their certain payoffs when the proposed public policy is rejected (the status-quo situation is unaltered), or approved. A change in each of these valuation parameters differently affects the expected payoffs of the two interest groups (see Proposition 5 in Nti, 1999). A change in the proposed public policy that marginally changes one of the valuation parameters cannot therefore Pareto-dominate the original policy proposal. However, if utility is transferable, such a change in the policy proposal can Pareto-dominate the original proposal. This is always true when the modified policy proposal increases u_H , v_L or v_H , which results in an increase in the aggregate expected payoff of the interest groups. It is also true when the modified proposal increases u_L , provided that the new stakes of the two interest groups are sufficiently close: the ratio between the stakes of the LB and HB players exceeds 0.732.

Culture, Politicization and Relative Rent Dissipation

A major concern in the contest literature has been the question how do changes in the parameters of the contest affect the lobbying efforts exerted by the contestants and, in turn, the extent of rent dissipation. This comparative statics analysis focused on such parameters as the nature of the rent, the number of contestants, the form of the contest success function, the contestants' valuations of the prize, the contestants' attitude toward risk (see Nitzan 1994 for a survey) and on the structure of the game (how the sharing rules of a collective rent and how the strategic contesting groups are formed, Baik, 1994, Baik and Lee, 1997, 2001, Hausken, 1995, Lee 1995, Nitzan, 1991). The nature of the government (the politicians' or bureaucrats' preferences) that very often accounts for the very existence of the contest was not one of the examined parameters and for a very good reason. If the prize of the contest or, more generally, if the contest prize system is exogenous, then the preferences of the government determine whether the contest exists or not and, in turn, whether some lobbying efforts are incurred, but they have no effect on their value. Specifically, if the government is sufficiently benevolent, that is, sufficiently concerned about the well being of the contestants rather than about its narrower interest, which is positively affected by the lobbying efforts directed to her, then it would not give rise to the socially disadvantageous contest. If, however, the government is not sufficiently benevolent, then it would give rise to the contest. The value of the rent-seeking expenditures is unique provided that the contest equilibrium is unique and it can serve as a measure of social inefficiency. When the contest prize system is given, the nature of the government thus determines whether the contest is viable or not, but it does not affect the lobbying efforts exerted in a viable contest. As expected, in such a setting more benevolence of the government can only turn a viable contest into a nonviable one, which implies a change from some positive to zero social waste. To sum up, increased benevolence can only eliminate the wasteful rent-seeking outlays.

In the extended contest of the preceding chapter, the objective function of the bureaucrat hinges on the weight assigned to social welfare relative to the rent-seeking outlays of the two interest groups that take part in the contest on the approval of the proposed policy. It is shown that increased politicization increases rent dissipation. However, the inverse relationship between politicization and efficiency no longer holds. Using the same model, we first propose a plausible definition of relative rent dissipation (RRD) that takes into account the fact that in the extended setting there is no fixed, exogenously given prize. RRD is defined as the ratio between the total rent-seeking outlays and the expected prize in equilibrium. Under an endogenous prize system, the inverse relationship between RRD and efficiency is partly re-established, namely, the qualitative RRD effect determines the aggregate expected payoff of the contestants, but not vice versa. The relationship between politicization or benevolence, and RRD is still ambiguous. In particular, RRD can be directly related to the government's degree of benevolence which is represented by its concern about the well being of the contestants. In such a case the expected payoff of the interest groups is inversely related to the degree of politicization. Our main result specifies the two conditions that give rise to this so far unnoticed "perverse" possibility.

1 The Public-policy Game

Applying the model presented in the previous chapter, let us assume that one contestant derives a higher benefit than the other. We therefore refer to one player as the low-benefit (LB) player and to the other player as the high-benefit (HB) player.

We first determine the Nash equilibrium of a more general two-player public-policy rent-seeking contest. Given this equilibrium, we then turn to the presentation of the general political economic game in which the bureaucrat's preferred policy is determined taking into account his political and professional commitments, his narrow self-interest and the political constraint that he faces, namely, the contest between the players affected by his proposed public policy.

a The Contest Between the Interest Groups

Let the ruling politician reject a proposed policy I with probability $\Pr_i = \Pr_L$. With no loss of generality, it is assumed that such rejection is the preferred outcome of contestant i . With probability $1 - \Pr_i$ the politician approves the proposed policy. The rent-seeking and rent-avoidance expenditures of the risk-neutral contestants are denoted by x_i . In this chapter we allow a general CSF,

$\Pr_i(x_i, x_j)$, that satisfies the following requirements:

$$\frac{\partial \Pr_i}{\partial x_i} > 0, \quad \frac{\partial \Pr_i}{\partial x_j} < 0 \quad \text{and} \quad \frac{\partial^2 \Pr_i}{\partial x_i^2} < 0 \quad {}^{43}$$

(the latter inequality ensures that the second-order conditions are satisfied).

b The Government: Office Holders and Ruling Politicians

As assumed in Eq. (B.8), the objective function of the bureaucrat that allows a broad spectrum of political cultures represented by the parameter α is of the following form:

$$G(.) = \alpha g \left(\sum_i \Pr_i n_i(I) \right) + (1 - 2\alpha) f(X^*) . \quad (\text{B.21})$$

Note that $\Pr_i n_i(I) (= E(w_i^*) + x_i^*)$.

This objective function, namely patterns of mixed commitments of the bureaucracy and of the ruling politicians as well as allocations of the total rent-seeking outlays between the wasteful and nonwasteful components.⁴⁴

2 Political Culture and Relative Rent Dissipation

When making the decision regarding the optimal level of the policy instrument I , the politically constrained bureaucrat who is a leading player maximizes $G(.)$, being aware of the equilibrium rent-seeking outlays corresponding to the different levels of his control variable I . The first-order condition that characterizes an interior solution of his problem is⁴⁵:

$$\frac{\partial \sum_i \Pr_i n_i(I)}{\partial I} = - \left(\frac{(1 - 2\alpha)}{\alpha} \frac{\partial f(X^*)}{\partial X^*} \frac{X^*}{\partial I} \right) \bigg/ \frac{\partial g \left(\sum_i \Pr_i n_i(I) \right)}{\partial \sum_i \Pr_i n_i(I)} . \quad (\text{B.22})$$

⁴³ The CSF assumed in Chapter 3, see Eq. (B.3), satisfies these assumptions.

⁴⁴ If $f(y) = g(y) = y$, then Eq. (B.21) can be rewritten as

$$G(.) = \alpha \sum_i E(w_i^*) - (1 - \alpha) X^* .$$

For a more detailed discussion on the properties and interpretation of this function, see Epstein and Nitzan (2002a).

⁴⁵ By the second-order condition,

$$\frac{\partial^2 G(.)}{\partial I^2} = \alpha \frac{\partial^2 g \left(\sum_i \Pr_i^* n_i(I^*) \right)}{\partial I^2} + (1 - 2\alpha) \frac{\partial^2 f(X^*)}{\partial I^2} < 0 .$$

Given that in our two-stage political economic game the bureaucrat is a leading player, we refer to (x_d, x_c, I^*) as the Stackelberg–Nash equilibrium of the public-policy game.

Recall that, by Proposition B2(a), $\text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right) = -\text{Sign} \left(\frac{\partial X^*}{\partial I} \right)$ and, by Proposition B2(b), $\frac{\partial X^*}{\partial \alpha} < 0$. As expected, increased benevolence of the government or, more generally, reduced politicization tends to reduce the rent-seeking outlays incurred by the interest groups that try to influence the government decision in their favor. In the rent-seeking literature considerable effort has been devoted to the study of rent dissipation (RD) (see, Gradstein and Konrad, 1999, Hillman and Riley, 1989, Nitzan, 1994, Ursprung, 1990 and Baik and Lee, 2001). Since, in our setting, the contest prize system is endogenous, we define *relative rent dissipation* (RRD) as the ratio between the total rent-seeking expenditures X^* and the equilibrium expected prize $\sum_i \text{Pr}_i^* n_i(I^*)$. That is,

$$\text{RRD} = \frac{X^*}{\sum_i \text{Pr}_i^* n_i(I^*)}. \quad (\text{B.23})$$

The effect of a change in the policy instrument I^* on RRD given by:

$$\frac{\partial \text{RRD}}{\partial I} = \frac{\frac{\partial X^*}{\partial I} \sum_i \text{Pr}_i^* n_i(I^*) - \frac{\partial \left(\sum_i \text{Pr}_i^* n_i(I^*) \right)}{\partial I} X^*}{\left(\sum_i \text{Pr}_i^* n_i(I^*) \right)^2}. \quad (\text{B.24})$$

The sign of this expression is equal to the sign of the numerator. Using Eq. (B.22) we obtain that the numerator in Eq. (B.24) is given by N^* ,

$$N^* = \frac{\partial X^*}{\partial I^*} \left(\sum_i \text{Pr}_i^* n_i(I^*) + \frac{(1-2\alpha)}{\alpha} \frac{\partial f(X^*)}{\partial X^*} \left(\frac{\partial g(\text{Pr}_i^* n_i(I^*))}{\partial \sum_i \text{Pr}_i^* n_i(I^*)} \right)^{-1} \right). \quad (\text{B.25})$$

Since $\text{Sign} \left(\frac{\partial \text{RRD}}{\partial \alpha} \right) = \text{Sign} \left(\frac{\partial \text{RRD}^*}{\partial I^*} \right) \text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right)$, we get that

$$\begin{aligned} & \text{Sign} \left(\frac{\partial \text{RRD}}{\partial \alpha} \right) \\ &= -\text{Sign} \left(\sum_i \text{Pr}_i^* n_i(I^*) + \frac{(1-2\alpha)}{\alpha} \frac{\partial f(X^*)}{\partial X^*} \left(\frac{\partial g \left(\sum_i \text{Pr}_i^* n_i(I^*) \right)}{\partial \sum_i \text{Pr}_i^* n_i(I^*)} \right)^{-1} \right), \end{aligned} \quad (\text{B.26})$$

which yields the following result:

Proposition B5:

- a. If $\alpha \leq 1/2$, $\text{Sign} \frac{\partial \text{RRD}}{\partial I^*} = \text{Sign} \frac{\partial X^*}{\partial I^*}$ and $\frac{\partial \text{RRD}}{\partial \alpha} < 0$.
- b. If $\alpha > 1/2$,
- (i) $\frac{2\alpha - 1}{\alpha} \frac{\partial f / \partial X^*}{\partial g / \partial \left(\sum_i \text{Pr}_i^* n_i(I^*) \right)} > \sum_i \text{Pr}_i^* n_i(I^*)$
 implies that $\text{Sign} \frac{\partial \text{RRD}}{\partial I^*} = -\text{Sign} \frac{\partial X^*}{\partial I^*}$ and $\frac{\partial \text{RRD}}{\partial \alpha} > 0$.
- (ii) Otherwise, $\text{Sign} \frac{\partial \text{RRD}}{\partial I^*} = \text{Sign} \frac{\partial X^*}{\partial I^*}$ and $\frac{\partial \text{RRD}}{\partial \alpha} < 0$.

By part *b(i)* of the Proposition, RRD can be positively related to the government's degree of benevolence that is represented by the weight α assigned to the well being of the contestants. In the previous chapter we obtained a related result, Proposition B3, establishing that if $\alpha > 1/2$ and

$$\frac{(2\alpha - 1)}{\alpha} \frac{\partial f(\cdot)}{\partial X^*} \Bigg/ \frac{\partial g(\cdot)}{\partial (\text{Pr}_L^* n_L(I^*) + \text{Pr}_H^* n_H(I^*))} > 1,$$

then increased politicization (a decline in α) reduces social welfare (the net aggregate expected payoff of the contestants). The intuition behind this possibility of welfare-enhancing increased politicization is as follows. The first condition, $\alpha > 1/2$, implies that $(1 - 2\alpha) < 0$, that is, the rent-seeking outlays X^* have a negative net impact on the bureaucrat's objective function. The second condition,

$$\frac{(2\alpha - 1)}{\alpha} \frac{\partial f(\cdot)}{\partial X^*} \Bigg/ \frac{\partial g(\cdot)}{\partial (\text{Pr}_L^* n_L(I^*) + \text{Pr}_H^* n_H(I^*))} > 1,$$

ensures that, in equilibrium, the marginal effect of a change in the rent-seeking outlays on the bureaucrat's objective function is larger than the marginal effect of a change in the gross expected welfare of the interest groups. A decline in α results in a change in the optimal I . Given the above second condition, to satisfy the first-order condition, the required increase in the gross expected welfare of the interest groups must be larger than the resulting increase in the rent-seeking outlays. The conditions specified in Proposition B3 are necessary but *not sufficient* for RRD to be increasing in α (provided that the expected prize is greater than one). Social welfare is defined as the expected equilibrium prize minus the rent-seeking outlays of the contestants. This definition implies that the effects of a change in α on social welfare and on RRD do not necessarily have opposite signs. Put differently, the qualitative effect of a change in α on RRD determines the qualitative effect on the social welfare.

The opposite claim is not true, that is, the qualitative effect of a change in α on social welfare does not determine the qualitative effect on RRD.

The condition obtained in Proposition B5 is a stronger one; it requires that $\alpha > 1/2$ and, in addition, that the marginal effect of a change in the rent-seeking outlays on the bureaucrat's objective function relative to the marginal effect of a change in the gross expected welfare of the interest groups is larger than the expected prize. Rewriting this condition using

$$\frac{2\alpha - 1}{\alpha} \frac{\partial f / \partial X^*}{\partial g / \partial \left(\sum_i \text{Pr}_i^* n_i(I^*) \right)} > \sum_i \text{Pr}_i^* n_i(I^*),$$

the necessary and sufficient condition becomes:

$$\alpha > 1/2 \quad \text{and} \quad \frac{\partial \sum_i \text{Pr}_i^* n_i(I^*)}{\partial I} > \sum_i \text{Pr}_i^* n_i(I^*). \quad (\text{B.27})$$

This condition implies that a change in the policy proposal must have a very strong impact on the expected prize. That is, the validity of the perverse effect of a change in α on RRD requires therefore that the relative change in the expected prize is larger than one, i.e. the expected change in the prize must be greater than the prize itself. Recall that the equilibrium rent-seeking outlays are inversely related to α . But a change in α may negatively affect the expected prize and, therefore, by definition, positively affect RRD. This latter effect must be sufficiently large in order for the total effect of the change in α on RRD to be positive.

In contests with an exogenous prize the expended efforts are often interpreted as social costs. Rent dissipation is therefore considered as a measure of social inefficiency. When the prize system is endogenous, the inverse relationship between lobbying efforts and welfare does not necessarily exist. Consequently, in such a case reduced politicization that lowers the lobbying efforts is not necessarily welfare enhancing, Proposition B3. When the prize system is endogenous, a change in RRD implies that the change in social welfare (the aggregate expected payoff of the contestants) has an opposite sign. However, the opposite claim is not true. That is, the sign of a change in social welfare does not determine the sign of the change in RRD. In this chapter we derived the necessary and sufficient conditions for RRD to be positively related to the degree of politicization or benevolence of the government. These conditions ensure, in particular, that social welfare is inversely related to the weight assigned by the government to social welfare.

The relationship between the change in the proposed policy and the RRD depends on the relationship between the total expenditure and the proposed policy. The effect a change in the degree of politicization has on the RRD is

independent of its effect on rent dissipation (the total rent-seeking outlays) as the latter is always negatively related to the degree of politicization. The nature of the contest between the two interest groups and, in particular, the number and nature of the stages of this (sub) contest determines their total rent-seeking efforts. Since these efforts depend on the proposed policy I , our results are robust to the nature of the contest between the interest groups and, in particular, to our assumptions regarding this subcontest.

VI

Lobbying and Compromise

Lobbying is an important part of the policy-making process in representative democracies, Grossman and Helpman (2001), Persson and Tabellini (2000). Several studies have addressed the issue to what extent lobbying affect policy? Modeling lobbying as a “menu-auction”, Grossman and Helpman (1996) study a Downsian model of electoral competition where candidates choose policies to maximize their probability of winning the elections. In their common-agency setting, lobbying induces candidates to select policies that constitute a compromise between the policy preferences of voters and the lobbies. More recently, building on the work of Besley and Coate (1997, 2001), Felli and Merlo (2001) study an alternative citizen–candidate model of electoral competition with “menu-auction” lobbying, assuming that the elected policy maker selects the lobbies that take part in the policy-making process. In their elaborate model, the equilibrium policy outcome is always a compromise between the policy preferences of the elected candidate and those of the (at most two) lobbies chosen by the policy maker.⁴⁶ In contrast to this literature, Glazer, Gradstein and Konrad (1998) demonstrate that extreme policies may appear not in spite of, but because of, political opposition. More specifically, an incumbent may gain political support by adopting a policy the challenger is more likely to change. The awareness of voters to the high cost of the more

⁴⁶ In the classical Downsian model of electoral competition, politicians are only concerned about winning the election. In a two-party system with politicians who are “office motivated”, an extreme compromise, namely, complete policy convergence is expected, Downs (1957). In a more general setting, politicians may face a trade-off between two objectives: the desire to be re-elected and the desire to implement a policy that is most preferred by the constituency supporting their party. In such an extended dynamic electoral model in which the voters are not fully informed about the preferences of the incumbent, Alesina and Cukierman (1990) show that the incumbent follows a policy that is a compromise between the other party’s ideal policy and his own ideal policy. In these earlier studies, however, the effect of lobbying on the nature of the proposed policy has not been examined.

likely policy change induces them to support the extreme policy proposed by the incumbent. The examples that are given by the authors are antiabortion stands by the republican party in the United States, proaffirmative action positions by the Democrats in the United States, adoption of the poll tax by Thatcher's government in the United Kingdom and moves towards privatization in some of the former Communist countries of Eastern Europe.

In a "menu-auction", an equilibrium comprises a set of contribution schedules that are optimal for the interest groups in light of the anticipated behavior of the politician who selects a policy that is his best response to the implicit offers of the interest groups. But an alternative political economic equilibrium may comprise of the policy proposals that are optimal for the interest groups in light of the anticipated outcome of the lobbying contest that hinges on their lobbying efforts. In this alternative setting the lobbying efforts are directed to the politician who approves one of the proposed policies and the contest outcome is the winning probabilities of the proposed policies.⁴⁷ Epstein and Nitzan (2004) have recently shown that in such a reduced-form, two-stage lobbying game, the policies proposed by the contestants also tend to be restrained (this will be discussed in Part D). Consequently, as in the common-agency literature, the implemented (winning) policy is always a compromise, that is, it belongs to the interior of the interval defined by the interest groups' (ex-post) preferred policies. However, in an imperfectly discriminating contest, the proposals of the different groups will not coincide. Munster (2004) shows that in a perfectly discriminating contest, (an all-pay auction) the proposed policies also tend to be restrained. In contrast to Epstein and Nitzan (2004), the proposals in the all-pay auction will coincide.

An alternative reduced-form public-policy contest is the one studied in the preceding chapter. In this extended contest there are three players. Two interest groups and a two-tier government. One interest group is "a challenger" who is interested in the approval of the proposed policy. A second interest group is "a defender" who prefers the status-quo and is therefore interested in the rejection of the proposed policy. The government consists of an elected politician who sets the agenda (proposes a policy that along with the status quo constitutes the agenda) and approves or rejects the proposed policy. The objective of the current chapter is to show that within a general class of this public-policy contest, contrary to the findings of Grossman and Helpman (1996), Felli and Merlo (2001) and Epstein and Nitzan (2004), lobbying may result in the proposal and implementation of an extreme policy. In other words, lobbying is not necessarily compromise enhancing. This result crucially depends on the policy maker (the politician in our case) being a "principal"

⁴⁷ The interest groups can also try and influence the proposed policy. In our setting the proposed policy is not directly affected by the lobbying groups. However, it is indirectly affected by the interest groups in light of the awareness of the politician, who proposes the policy, to the lobbying efforts of the interest groups and their effect on the outcome of the contest.

and on his having an effective incentive to be extreme. The existence of such an incentive hinges on the payoffs (contest stakes) of the interest groups and their dependence on the implemented policy and on the preferences of the policy maker. In contrast to Epstein and Nitzan (2004) and Munster (2004), who consider the case where two interest groups compete over the approval of a policy that each of them proposes, in this chapter we assume that the decision on the proposal is made by the politician and not by the interest groups. As in Hillman (1982), Grossman and Helpman (2001) and in the previous chapter, we assume that the politician's utility is a composite function of the public well being (social welfare) and the lobbying outlays made by the interest groups. When the lobbying outlays are positively related to the policy set by the politician, the stronger his narrow motivation represented by the weight assigned to the lobbying outlays, the more extreme is the proposed policy. It is therefore possible that the defender and the challenger of the status quo prefer a policy that is less radical and more efficient than the policy proposed by the politician. In particular, it is possible that more than the calf (challenger of the status-quo policy) wishes to suck the cow (politician) desires to suckle. When this happens the politician seems to be more concerned than the challenger about enhancing the latter's interest.⁴⁸ We analyze both the perfectly and imperfectly discriminating contests. Our main result specifies sufficient conditions to lobbying that gives rise to a proposed policy that is more extreme than the proposals preferred by the interest groups.⁴⁹ Examples of such policies can be the type of policies presented by Glazer, Gradstein and Konrad (1998) or other examples such as the determination of minimum wage, see Grossman and Helpman (2001, Sect. 2), where the proposed minimum wage is more extreme than the union's most preferred wage. Another example is the issue of migration quotas that is very important in the United States and in Europe. Governments determine quotas that may well exceed the quota preferred by the capital owner who takes part in the political contest over the

⁴⁸ Esteban and Ray (1999) observe that in a classical contest game where the two players not only have to decide about how much lobbying effort to provide, but also for which alternative they want to lobby, all lobbyists will always invest their effort in favor of their most preferred policy alternative. Hence, we would have expected that agenda setting does not harm the interest groups while enhancing a compromise. As mentioned above, we show that this is not the case and that the proposed policy may well be more extreme even relative to the ideal certain proposal of the challenger. Note that if the proposed equilibrium policy is approved, it is also implemented because, ex-post, the challenger prefers it to his ex-ante most preferred policy.

⁴⁹ Our main result is related to the studies of Cairns and Long (1991) and Glazer and McMillan (1992) on voluntary price regulation. Using a different settings inspired by Becker's (1983) pressure model, these authors show that, within a monopoly context, the threat of price regulation due to an effective political opposition by consumers may induce the monopolist to price below the unregulated price.

quota, and this quota can be lower than his optimal amount of migrants in a situation where the quota is certainly approved (there is no political contest on the determination of the quota), see for example Boeri, Hanson and McCormick (2002). The price of a regulated monopoly, Baik (1999), Epstein and Nitzan (2003b), or the degree of restriction of bank branching, Kroszner and Strahan (1999), may well be other examples where the proposed policy is more extreme than the policy that would have been proposed by the relevant interest groups.

We first present the public-policy game and then the conditions that lead to noncompromise-enhancing lobbying under imperfectly and perfectly discriminating contests.

1 The Public-policy Game

We follow the definitions and the structure of the contest presented in Part B Sect. IV. Suppose that a status-quo policy, I_s , is challenged by one interest group and defended by another group. This policy can be the price of a regulated monopoly, Baik (1999), Epstein and Nitzan (2003b), the degree of restriction of bank branching, Kroszner and Strahan (1999), or the determination of minimum wage, Grossman and Helpman (2001, Sect. 2). The defender of the status-quo policy (henceforth, interest group d) prefers the status-quo policy I_s to any alternative policy. The most preferred policy of the challenger of the status-quo policy (interest group c) is I_c . With no loss of generality, it is assumed that $I_s < I_c$ and that the policy $I_s(I_c)$ is the optimal policy proposal of the defender (the challenger), provided that his supported policy gains certain approval.⁵⁰ That is, each of these policies is optimal for the respective interest group when it disregards the possibility that its proposed policy can be rejected, in which case, by assumption, the policy proposed by the rival interest group is approved.

The interest groups are engaged in lobbying activities because they wish to increase their probability of winning the public-policy contest, i.e. secure the realization of their preferred policy.⁵¹ In our model the lobbying groups do not try to directly affect the policy proposed by the politician. Rather, the lobbying efforts are directed to the politician who approves or rejects the proposed policy and therefore they do affect, indirectly, the policy proposed by the politician. Interest group d wins the contest when the proposed policy is rejected. In such a case the status quo I_s is implemented. Its benefit in such a case is its avoided loss. Interest group c wins the contest when the proposed policy is approved and implemented. The ruling politician is responsible for

⁵⁰ Note that assuming that $I_s > I_c$ would not qualitatively change any of our results.

⁵¹ Modeling the rent seekers as single agents presumes that they have already solved their collective action problem. The proposed model thus applies to already formed interest groups.

the existence of the contest, being aware of its direct potential benefit, namely, of the possibility to benefit from part or all of the lobbying outlays. He may also be aware of the effect of his decision on his probability of being re-elected either via the expected campaign contributions of the contestants or via the expected support of the voters whose welfare depends on the policy of the government.

As in Eq. (A.3), the expected net payoff of the two interest groups, d and c are given by

$$E(u_d) = \Pr_d n_d(I) - x_d \quad \text{and} \quad E(u_c) = \Pr_c n_c(I) - x_c, \quad (\text{B.28})$$

where n_d and n_c denote, respectively, the net benefits or the contest stakes of the interest groups. We assume that for any I in the interval $[I_s, I_c]$, an increase in the proposed policy I increases the stakes of both interest groups, that is,

$$\frac{\partial n_d(I)}{\partial I} > 0 \quad \text{and} \quad \frac{\partial n_c(I)}{\partial I} > 0.^{52}$$

By our assumptions, the interest groups participate in the contest, that is, x_d and x_c are positive. We therefore focus on interior Nash equilibria of the second stage of the contest. Solving the first-order conditions we obtain:

$$\Delta_i = \frac{\partial \Pr_i(x_i, x_j)}{\partial x_i} n_i(I) - 1 = 0 \quad \forall i \neq j \quad \text{and} \quad i, j = d, c. \quad (\text{B.29})$$

In the first stage of the game, the politician selects his strategy, that is, the proposed policy I subject to, the political constraint, namely, subject to the lobbying contest on the approval of his proposal. Hence, as mentioned above, his objective function $G(\cdot)$ is of the general form⁵³ $G(E(u_c); E(u_d); (x_c + x_d))$, where $E(u_c)$ and $E(u_d)$ are the expected net payoffs of the challenger and the defender that positively affect G . The contestants' lobbying outlays $(x_d + x_c) = X$ represent either transfers to the government or resources wasted in the contest. Note that taking into account the public interest is consistent with the politician being either benevolent or realistic (wishing to be re-elected).

The first-order condition for an interior maximization of $G(\cdot)$ with respect to I requires that

$$\frac{\partial G(\cdot)}{\partial E(u_c^*)} \frac{\partial E(u_c^*)}{\partial I} + \frac{\partial G(\cdot)}{\partial E(u_d^*)} \frac{\partial E(u_d^*)}{\partial I} + \frac{\partial G(\cdot)}{\partial X^*} \frac{\partial X^*}{\partial I} = 0. \quad (\text{B.30})$$

⁵² This condition holds in many situations. In particular, it holds in the context of monopoly-price regulation, where I_s is the competitive status-quo price and I_c is the profit-maximizing monopoly price, see Epstein and Nitzan (2003b). The assumption is also plausible in the context of minimum-wage determination, where I_s represents the existing equilibrium wage and I_c represents the minimum wage preferred by the workers' union or in the context of protective trade policy (by tariff or quota).

⁵³ See Epstein and Nitzan (2002a).

A subgame perfect interior Nash equilibrium of the public-policy contest is thus characterized by the three equalities in Eqs. (B.29) and (B.30).

2 A Noncompromising Equilibrium Policy

The existence of a noncompromising equilibrium policy requires that the policy maker has an effective incentive to propose a policy that is more extreme than one of the preferred proposals of the interest groups. The effectiveness of the incentive in our setting is partly due to the fact that the policy preferred by both the challenger and the defender is restrained. Let us first clarify this point by considering the proposed policies that the interest groups prefer. By assumption, interest group d prefers the status-quo I_s to any proposed policy. Since I_s maximizes the stake of this interest group, $\left. \frac{\partial n_d(I)}{\partial I} \right|_{I=I_s} = 0$. Similarly, the policy I_c maximizes the stake of interest group c , which implies that $\left. \frac{\partial n_c(I)}{\partial I} \right|_{I=I_c} = 0$. To understand the result let us consider the optimal proposal by interest group c . The policy I_c^* that maximizes interest group c 's expected payoff $E(u_c)$ is characterized by the following first-order condition:

$$\frac{\partial E(u_c)}{\partial I} = \frac{\partial \text{Pr}_c}{\partial x_c} \frac{\partial x_c}{\partial I} n_c + \frac{\partial \text{Pr}_c}{\partial x_d} \frac{\partial x_d}{\partial I} n_c + \text{Pr}_c \frac{\partial n_c}{\partial I} - \frac{\partial x_c}{\partial I} = 0. \quad (\text{B.31})$$

By the two main results in Epstein and Nitzan (2004),⁵⁴ as long as the two interest groups engage in a viable contest in the second stage of the game, in equilibrium they are induced to voluntarily moderate their proposals relative to their best policies when they do not need to take into account the opposition of the other interest group. Thus,

Lemma B2: *Under the imperfectly discriminating contest*

$$I_c^* < I_c, \quad I_d^* > I_s \quad \text{where} \quad I_c^* > I_d^* \quad \text{and} \quad X^* > 0.$$

In light of this lemma, the challenger would not lobby for his best policy under certainty I_c , but rather for his optimal policy I_c^* , and the defender would not lobby for his best policy under certainty I_s , but rather for his optimal policy I_d^* . The optimal policies I_c^* and I_d^* maximize the expected net payoffs of c and d . The intuition for this result is that if there is no opposition the challenger chooses the policy I_c . In the presence of an opposition, the challenger realizes that lowering his proposal below I_c leads to a decrease of his payoff from winning the contest. But the more restrained proposal yields an increase in the payoff of the opponent and, in turn, a reduction in his

⁵⁴ It can be verified that the conditions needed for applying the results in Epstein and Nitzan (2004) are satisfied.

stake that induces him to become less aggressive. The resulting decline in the defender's probability of winning the contest clearly benefits the challenger. Since the latter favorable effect dominates the former unfavorable effect, the challenger prefers to restrain his lobbying target, i.e. propose a policy below I_c . A similar intuition explains the readiness of the defender of the status quo to moderate his position by proposing a policy that exceeds I_s .

As the proposals of the contestants do not converge, both will invest effort in order to win the contest and therefore the total amount of resources invested in such a contest will be positive, $X^* > 0$.

A Perfectly Discriminating Contest

Let us now consider the endogenous policy proposals of the defender and the challenger under the perfectly discriminating contest, i.e. the all-pay auction. Under this type of contest, the interest group that invests the highest amount of effort wins the contest. That is, the winning probability of interest group i is equal to:

$$\Pr_i = \begin{cases} 1 & \text{if } x_i > x_j, \forall i \neq j \\ \frac{1}{2} & \text{if } x_i = x_j, \forall i \neq j \\ 0 & \text{if } x_j > x_i, \forall i \neq j \end{cases} \quad (\text{B.32})$$

and so its net payoff is given by:

$$E(u_i) = \begin{cases} n_i(I) - x_i & \text{if } x_i > x_j, \forall i \neq j \\ \frac{1}{2}n_i(I) - x_i & \text{if } x_i = x_j, \forall i \neq j \\ -x_i & \text{if } x_j > x_i, \forall i \neq j \end{cases} \quad (\text{B.33})$$

Munster (2004) shows that under the all-pay auction, in equilibrium both players propose the same proposal. That is,

Lemma B3: *Under the perfectly discriminating contest*

$$I_c^* < I_c, \quad I_d^* > I_s \quad \text{such that} \quad I_c^* = I_d^* \quad \text{and} \quad X^* = 0.$$

Since the two interest groups propose the same policy, there will be no need for a contest between the groups. This implies that the interest groups will not invest effort in trying to win the contest, $X^* = 0$.

The difference in the findings in the two types of contests is due to their different nature. In an imperfectly discriminating contest, the group that chooses the higher lobbying outlay doesn't necessarily win. There is some "noise" in the determination of the winner and the winning probabilities are continuous functions of the lobbying efforts.

3 Public Policy

The effectiveness of the policy-maker's incentive to propose a policy that exceeds I_c^* or is lower than I_d^* depends on the sensitivity of G with respect to its three arguments and on the sensitivity of the equilibrium total lobbying outlays X^* and of the expected utility of the interest groups with respect to the proposed policy. Let I^{**} denote the equilibrium policy that satisfies Eq. (B.23). At I_c^* , $\left. \frac{\partial E(u_c)}{\partial I} \right|_{I=I_c^*} = 0$, at I_d^* , $\left. \frac{\partial E(u_d)}{\partial I} \right|_{I=I_d^*} = 0$ and therefore at I^{**} , $\left. \frac{\partial E(u_c)}{\partial I} \right|_{I=I^{**}} < 0$ and $\left. \frac{\partial E(u_d)}{\partial I} \right|_{I=I^{**}} < 0$. By the equilibrium condition (B.30), we therefore get that $I^{**} > I_c^*$ or $I^{**} < I_d^*$ if

$$\begin{aligned}
 & -\frac{1}{\left. \frac{\partial G}{\partial X} \right|_{I=I^{**}}} \left[\left. \frac{\partial G}{\partial E(u_d)} \right|_{I=I^{**}} \left. \frac{\partial E(u_d)}{\partial I} \right|_{I=I^{**}} + \left. \frac{\partial G}{\partial E(u_c)} \right|_{I=I^{**}} \left. \frac{\partial E(u_c)}{\partial I} \right|_{I=I^{**}} \right] \\
 & < \left. \frac{\partial X}{\partial I} \right|_{I=I^{**}}. \tag{B.34}
 \end{aligned}$$

Notice that the LHS of Eq. (B.34) is positive and since its RHS is independent of $G(\cdot)$, we obtain

Proposition B6: *$I^{**} > I_c^*$ or $I^{**} < I_d^*$, if at I^{**} , $\left. \frac{\partial X^*}{\partial I} \right|_{I=I^{**}} > 0$ and the sensitivity of $G(\cdot)$ with respect to X relative to its sensitivity with respect to $E(u_d)$ and $E(u_c)$ is sufficiently large.*

Note that $\left. \frac{\partial E(u_d)}{\partial I} \right|_{I=I^{**}} < 0$ and $\left. \frac{\partial E(u_c)}{\partial I} \right|_{I=I^{**}} < 0$. Therefore, since $\left. \frac{\partial G}{\partial E(u_d)} \right|_{I=I^{**}} > 0$ and $\left. \frac{\partial G}{\partial E(u_c)} \right|_{I=I^{**}} > 0$, if $\left. \frac{\partial X}{\partial I} \right|_{I=I^{**}} > 0$, then for Eq. (B.34) to hold, $\left. \frac{\partial G}{\partial X} \right|_{I=I^{**}} > 0$ must be satisfied.

If, for example, $G(E(u_c); E(u_d); (x_c + x_d)) = G((x_c + x_d))$, then (both in the perfectly and imperfectly discriminating contest) a sufficient condition for the Proposition to hold is that $\left. \frac{\partial X^*}{\partial I} \right|_{I=I^{**}} > 0$.⁵⁵ Recall that under the perfectly discriminating contest, the all-pay auction, the total amount of resources invested in the contest under the proposals of the interest groups will be zero. Therefore, if the politician wishes to obtain outlays, he/she must propose a policy that is more extreme than that of the interest groups.

⁵⁵ For example, in the case of monopoly price determination, if the demand is given by: $p = 1 - q$, the marginal cost equals zero and the CSF is Tullock's lottery logit function, the monopoly profit-maximization price is equal to 0.5 while the price that maximizes the total lobbying efforts incurred by the contestants is equal to 0.575426.

As we can see, in the above condition the effect of a change in the proposed policy on the lobbying efforts of the contestants plays an important role. In general, the effect of a change in the proposed policy I on X^* is ambiguous in the imperfectly discriminating contest while it is positive in the all-pay auction. The role of stake-asymmetry and ability-asymmetry between the interest groups in determining the sign of $\frac{\partial X^*}{\partial I}$ is clarified in Epstein and Nitzan (2006b).⁵⁶ A simple sufficient condition ensuring that the total lobbying outlays are monotone increasing in the policy set by the politician is stated in terms of the relative stakes and the relative stake elasticities of the interest groups.⁵⁷

Proposition B6 implies that the policy set by the politician can be higher or lower than the policy the challenger prefers, provided that two conditions are satisfied. First, the sufficient condition ensuring that an increase in the policy proposal I increases the total lobbying efforts of the two interest groups (which is satisfied in the case of an all-pay auction); Second, the marginal effect on G of a change in the contestants' total lobbying expenditures is sufficiently high relative to the marginal effect on G of a change in the expected utility of the interest groups. In other words, an increase in the policy I has two conflicting effects on G . It increases G via the increase in the total lobbying expenditures X while decreasing G via the reduction in the expected pay-offs of the status-quo defender and its challenger. The condition stated in the Proposition requires that the former effect on G is sufficiently high relative to the latter effect. Since, by Lemmas B2 and B3, for example, the challenger's certain most preferred policy I_c^* is smaller than I_c , it is clear that under such circumstances, the equilibrium policy I^{**} proposed by the politician can exceed both the challenger's preferred policy I_c^* and I_c (in the same way the policy may be lower than I_d^* and I_s). Note that if the proposed policy I^{**} , $I^{**} > I_c^*$, is the ex-post outcome of the contest, namely, the politician's proposal I^{**} is approved by the politician, then the challenger voluntarily offers its cooperation to implement this policy because ex-post it is preferred to I_c^* . One can relate to the proposed policy I^{**} and to the challenger's optimal policy I_c^* as direct measures of the extent of the permissible and the (challenger's) desired surplus extraction from the defender. The conditions stated in the Proposition give rise to a situation where the proposed policy is more extreme and less efficient than the challenger's ex-ante preferred policy. In such a case lobbying is not compromise enhancing and one can say that more

⁵⁶ Note that asymmetry in the contestants' ability depends on the form of the contest success function and, in particular, on its second-order cross derivatives. However, it also depends on the stakes of the interest groups because these cross derivatives are computed in equilibrium, which is affected by the stakes.

⁵⁷ In the context of monopoly regulation, Epstein and Nitzan (2003b), the sufficient condition is satisfied, so an increase in the proposed price increases the total lobbying expenditure of the interest groups.

than the calf (the challenger) wishes to suck does the cow (politician) desire to suckle.^{58,59}

In the political economic game of policy determination by the government that we have analyzed, a politician proposes the public policy and the proposal is then approved or rejected according to a CSF. The politician's proposed policy directly affects the stakes of the two interest groups, the contestants, and, in turn, first, their equilibrium lobbying efforts and, second, their equilibrium expected payoffs. The proposed policy is set such that the politician's objective function that depends on the contestants' lobbying outlays and on their aggregate expected payoff is maximized. It has been shown that, depending on the objective function of the politician and on the interest groups' net payoffs, it may well be the case that the proposed policy is higher, more extreme and less efficient than the policy the interest groups would have preferred that the politician proposed under certainty. Such a situation occurs when, first, an increase in the policy proposal increases the total lobbying efforts of the two interest groups and, second, the marginal effect on the politician's objective function of a change in the contestants' lobbying outlays is sufficiently high relative to the marginal effect of a change in the expected utility of the interest groups. The proposed policy can, in particular, be the policy that maximizes the challenger's certain stakes. If this is the case, that is, if the politician proposes the challenger's optimal policy under certainty, then we are assured that the challenger always prefers a less extreme policy. However, the proposed policy may be even more extreme than the policy that maximizes the challenger's certain stakes.

In our model the lobbying efforts of the interest groups are directed to the politicians at the second stage of approval or rejection of the proposed policy. Alternatively, the interest groups can lobby the politician at the first stage in order to influence his proposed policy. In general, the interest groups may wish to influence both the proposed policy and the probability of its approval and therefore allocate their lobbying efforts between the two stages. In such alternative lobbying models, as long as the proposed policy or the approval of the proposed policy remain uncertain from the viewpoint of the interest groups, the main insight of the present study is basically preserved. Uncertainty regarding the contest outcome and a policy maker who is a "principal" are the basic modeling features necessary for the existence of noncompromising lobbying. The sufficient conditions require appropriate relative commitments of the politician to the enhancement of the well being of the interest groups and to the increase of the lobbying outlays and appropriate relative stakes and rel-

⁵⁸ Of course, ex-ante any equilibrium is a compromise because it is a lottery between the status quo and the proposed policy. The nonexistence of the compromising effect of lobbying in our setting focuses on the comparison between the policy proposed by the politician and the policy proposal that is actually preferred by the challenger. Of course, ex-post, a more extreme proposed policy can be implemented.

⁵⁹ The same type of analysis can be carried out for the defender.

ative stake elasticities of the interest groups that ensure the positive effect of a change in the proposed policy on the total lobbying efforts. Therefore, we obtain that if the government is not directly involved in the determination of the proposals (as in Epstein and Nitzan, 2004), then moderation of the proposals will occur, however, if the government is involved directly in determining the proposal, then we have shown sufficient conditions for polarization.

Our analysis has been confined to a reduced form, very simple public-policy contest that has micro foundations for both the imperfectly discriminating contest and the discriminating contest – the all-pay auction. Despite its simplicity, this stylized setting is sufficient to illustrate that the compromise enhancing effect of lobbying is not necessarily valid when the policy maker, the politician in our case, is a “principal” rather than an “agent”. As is well known from other models of special interest politics, institutional details – such as the number of candidates, the number of interest groups, the voting rule, the amendment rules, the procedures for government formation and dissolution – can have a marked effect on outcomes. This has been indeed demonstrated in this chapter regarding the effect of lobbying on the nature of the equilibrium public policy.

The Policy Effect

In this part we investigate a general class of two-player public-policy contests and examine the effect of a change in the proposed policy, a change that may affect the payoffs of one or both of the contestants, on their effort and performance. In particular, we focus on the role of three types of asymmetry between the contestants on the sensitivity of their effort and performance to the proposed public policy.

VII

Effort and Performance

Tournaments, conflict, patent races and rent-seeking have been modeled as contests in which participants exert efforts to increase their probability of winning a prize. In most studies of contests, however, the source of the prize or, more generally, the source of the contestants' prize valuations has been ignored. Despite the fact that in some studies the source of the prize system was based on the existence of monopoly profits (rents) or various forms of protective trade policies, see, for example, Mueller (2003), the general role of public policy as a determinant of the contest prize system has not been adequately studied. The main objective of this chapter is to accomplish this task.

We focus on common situations where the prize system is determined by the government and the contestants are two interest groups, as in Chapter IV. The choice of the government is to either remain with the status quo or supplant it with a proposed new policy. The prizes of the affected interest groups are given by the differences between their payoffs under the existing system and their payoffs under the proposed policy. Whether the proposed policy is implemented depends on the outcome of a political contest in which the two interest groups exert efforts to influence the probabilities of their preferred alternative. One interest group favors the status quo while the other favors the proposed policy. For example, a tax reform may be supported by one industry and opposed by another. Existing pollution standards may be defended by the industry and challenged by an environmentalist interest group. A monopoly may face the opposition of a customers coalition fighting for appropriate regulation.⁶⁰ Capital owners and a workers union may be engaged in a contest that determines the minimum wage, and so on.⁶¹ The outcome

⁶⁰ A special case of this setting is studied by Baik (1999) who analyzes the welfare effect of consumer opposition to the existence of monopoly rents.

⁶¹ Two recent examples from US politics that illustrate the public-policy contest that we study are the congressional reviews of late-term Clinton administration actions on ergonomics and environmental regulations on land use in national

of such contests depends on the contestants' exerted efforts (fighting, lobbying or rent-seeking efforts), that depend, in turn, on the parameters of the contest and, in particular, on the contestants' payoffs in the event that the public-policy proposal is approved or rejected. Some of the above examples are briefly discussed below to illustrate the effect of policy reform on the payoff structure of the contestants.

A major concern in the contest literature has been the issue of how changes in the parameters of the contest (number, valuations and abilities of the contestants and the nature of the information they have) affect the equilibrium efforts of the contestants and the extent of relative prize dissipation, Hillman and Riley (1989), Hurley and Shogren (1998) and Nitzan (1994). In addition, attention has been paid to the effect of changes in these parameters on the contestants' expected payoffs, Baik (1994), Gradstein (1995) and Nti (1997, 1999). The main concern of this chapter is the clarification of the effect of changes in public policy on the contestants' efforts and on their probabilities of winning the contest. Earlier studies examined the sensitivity of total efforts to changes either in the value of the prize⁶² or in the prize valuation of one of the contestants. Our extended comparative statics analysis focuses on the effects of a change in the proposed public policy that generates simultaneous modifications in the prize valuations of all the contestants. Nevertheless, even in those cases that such a change only modifies the prize valuation of a single contestant, we generalize the existing results that dealt with special forms of our general CSF.

We first present a generalized framework of the binary public-policy contests with two possible states of nature (approval and rejection of the proposed policy) that was presented in Chapter II, allowing the general CSFs axiomatized by Skaperdas (1996). The rest of the chapter is then devoted to the comparative-statics properties of the public-policy contest and, in particular, to the clarification of the role of three types of asymmetry between the contestants on the sensitivity of their effort and performance to the proposed public policy.

forests. Both regulations were reviewed and criticized by the new Congress, and both could have been squelched. But the ergonomics regulations (a decade in the making) were overturned under the Congressional Review Act of 1996, while the environmental regulations were allowed to stand. The explanations for these outcomes can be traced to the strength of the interest groups supporting the regulations (organized labor and the environmental lobby, respectively).

⁶² In a two-stage contest the prize can be endogenously determined by the contestants. Konrad (2002) examines the role of incumbency advantages for investment that increases the size of the contested prize. Epstein and Nitzan (2004) focus on the role of strategic restraint in contests.

1 The Public-policy Contest

As in Chap. IV, the players are two risk-neutral interest groups that are differently affected by the approval and rejection of a proposed policy. In general, one group derives a higher benefit than the other from the realization of its preferred policy. We therefore refer to one player as the low-benefit (LB) player and to the other player as the high-benefit (HB) player. The interest groups engage in a complete-information contest that determines the probabilities of approval and rejection of the proposed policy.⁶³ The expected net payoff of i as defined in Eq. (A.1) is equal to:

$$E(w_i) = \Pr_i u_i(I) + \Pr_j v_i(I) - x_i, \quad i \neq j. \quad (\text{A.1})$$

Given the contestants' efforts, the probabilities of approval and rejection of the proposed policy, $\Pr_L$ and $\Pr_H$, are obtained by the CSF. As in Skaperdas (1992), it is assumed that

$$\frac{\partial \Pr_i(x_i, x_j)}{\partial x_i} > 0, \quad \frac{\partial \Pr_i(x_i, x_j)}{\partial x_j} < 0$$

and given x_j , there exists $\underline{x}_i$ such that, for

$$x_i \geq \underline{x}_i, \quad \frac{\partial^2 \Pr_i(x_i, x_j)}{\partial x_i^2} < 0 \quad {}^{64,65}$$

(the latter inequality ensures that the second-order conditions are satisfied).

⁶³ Modeling the contestants as single agents presumes that they have already solved the collective action problem. The model thus applies to already formed interest groups.

⁶⁴ The functional forms of the CSF's $\Pr_i(x_i, x_j)$ commonly assumed in the literature, see Nitzan (1994) and Skaperdas (1996), satisfy these assumptions.

⁶⁵ To ensure that the equilibrium is a pure strategy Nash equilibrium and that it is unique, in addition to the assumed properties of the CSF, we have to add the following requirement (see Skaperdas, 1992):

$$\Pr_i(x_i, x_j)(1 - \Pr_i(x_i, x_j)) \frac{\partial^2 \Pr_i(x_i, x_j)}{\partial x_i \partial x_j} + (2\Pr_i(x_i, x_j) - 1) \frac{\partial \Pr_i(x_i, x_j)}{\partial x_i} \frac{\partial \Pr_i(x_i, x_j)}{\partial x_j} = 0.$$

This condition is satisfied if $\frac{\partial^2 \Pr_i(x_i, x_j)}{\partial x_i \partial x_j} = 0$ if $\Pr_i(x_i, x_j) = 0.5$. This plausible assumption means that player i has an advantage in terms of ability, if a change in j 's effort positively affects his marginal winning probability. In other words, a positive (negative) sign of the cross second-order partial derivative of $\Pr_i(x_i, x_j)$, $\frac{\partial^2 \Pr_i}{\partial x_j \partial x_i}$, implies that i has an advantage (disadvantage) when j 's effort changes. Note that this assumption is satisfied by many CSFs that have been studied in the literature (see Skaperdas, 1992).

Since $\Pr_i(x_i, x_j) + \Pr_j(x_j, x_i) = 1$, $i \neq j$, it holds that

$$\frac{\partial^2 \Pr_i(x_i, x_j)}{\partial x_i \partial x_j} = -\frac{\partial^2 \Pr_j(x_j, x_i)}{\partial x_i \partial x_j}. \quad (\text{C.1})$$

The ability of a contestant j to convert effort into probability of winning the contest can be represented by the marginal effect of a change in his effort on his winning probability. By assumption, this marginal effect is declining with his own effort. A change in his effort also affects, however, the marginal winning probability of his opponent i . The opponent i has an advantage in terms of ability if a change in j 's effort positively affects his marginal winning probability. In other words, a positive (negative) sign of the cross second-order partial derivative of $\Pr_i(x_i, x_j)$, $\frac{\partial^2 \Pr_i}{\partial x_j \partial x_i}$, implies that i has an advantage (disadvantage) when j 's effort changes. At some given combination of efforts (x_i, x_j) , the ratio between the effect of a change in j 's effort on the marginal winning probability of i and the effect of a change in j 's effort on his own ability, $\frac{\partial^2 \Pr_i}{\partial x_i \partial x_j} / \left(\frac{\partial^2 \Pr_j}{\partial x_j^2} \right)$, is therefore a local measure of the asymmetry between the abilities of i and j . This asymmetry together with two types of stake-asymmetry that are presented below play a crucial role in determining the comparative statics effects on which this study focuses.

As denoted in section A $n_i = (u_i - v_i)$ is the stake of player i (his real benefit from winning the contest), (see Baik, 1999, Epstein and Nitzan, 2002a, 2002b, and Nti, 1999). A player's stake is secured when he wins the contest, that is, when his preferred policy is the outcome of the contest. Recall that for one player the desirable outcome is associated with the approval of the proposed policy, while for the other player the desirable outcome is realized when the proposed policy is rejected. From Eq. (A.2) the expected net payoff of interest group i can be rewritten as follows:

$$E(w_i) = v_i(I) + \Pr_i n_i(I) - x_i. \quad (\text{A.2})$$

In general, the stakes of the contestants are different, that is, one of them has an advantage over the other in terms of his benefit from winning the contest. With no loss of generality, we assume that $n_L \leq n_H$. The ratio n_L/n_H is a measure of the asymmetry between the stakes of the contestants.⁶⁶

⁶⁶ Suppose that the policy I determines the total prize of the contest $V(I)$ and the contestants' shares $\alpha_j(I)$ and $\alpha_i(I)$ in $V(I)$. Contestant i 's stake is now equal to $n_i(I) = \alpha_i(I)V(I)$, where $0 < \alpha_i(I) < 1$ and $\alpha_j(I) + \alpha_i(I) = 1$. This alternative formulation enables a convenient look at the three factors affected by the policy I , namely, the value of the contest V , the derivative V' and the shares $\alpha_j(I)$ and $\alpha_i(I)$. Notice that the sign of V'/V determines whether public policy is more or less restrictive and α_i/α_j represents the asymmetry in the contestants' stakes. We will explore this direction further in the next chapter.

By our assumptions, both players participate in the contest⁶⁷ (x_L and x_H are positive). We therefore focus on the unique interior Nash equilibria of the contest. Solving the first-order conditions

$$\left(\frac{\partial E(w_L)}{\partial x_L} = 0 \quad \text{and} \quad \frac{\partial E(w_H)}{\partial x_H} = 0 \right)$$

we obtain:

$$\Delta_i = \frac{\partial \text{Pr}_i(x_i, x_j)}{\partial x_i} n_i(I) - 1 = 0 \quad \forall i \neq j \quad \text{and } i, j = L, H. \quad (\text{C.2})$$

Thus, the first-order conditions require⁶⁸ that:

$$\frac{\partial \text{Pr}_i}{\partial x_i} = \frac{1}{n_i(I)}, \quad i = L, H. \quad (\text{C.3})$$

By the expressions in Eq. (C.3) that determine the equilibrium efforts of the players and their probabilities of winning the contest and by the assumed properties of the CSF, we directly obtain that under a symmetric CSF⁶⁹ ($\forall x_i, x_j, \text{Pr}_i(x_i, x_j) = \text{Pr}_j(x_j, x_i)$), the player with the higher stake makes a larger effort and has a higher probability of winning the contest. The probability of the socially more efficient outcome of the contest is thus higher than the probability of the less efficient outcome. For a similar result see Baik (1994) and Nti (1999).

2 Public Policy and the Prize System (The Contestants' Stakes)

A change in the policy instrument I affects the stakes of the players and thus their efforts and their probability of winning the contest.⁷⁰ In this section we examine how a change in the proposed policy affects the prize system, that is, the contestants' stakes, assuming that the functions $n_i(I)$ ($i = L, H$) are continuous and twice differentiable in I . A policy reform may affect the stake of one of the contestants or the stakes of both of them. Denoting the effect of a change in I on n_i by n'_i , $n'_i = \frac{\partial n_i}{\partial I}$, our subsequent analysis relates to all of

⁶⁷ It is assumed that both players participate in the contest, i.e.

$$\left. \frac{\partial \text{Pr}_i(x_i, x_j)}{\partial x_i} \right|_{x_i=0} > \frac{1}{n_i(I)} \forall x_j \quad \text{and } i \neq j.$$

⁶⁸ It can be easily verified that the second-order conditions hold.

⁶⁹ Such symmetry implies that the two players share an equal ability to convert effort into probability of winning the contest.

⁷⁰ Note that the domain of the policy instrument I , the closed interval, may reflect economic feasibility or political feasibility.

the following five possible types of public-policy effects on the stakes of the interest groups:

Table C.1. The possible types of policy reform

Type	n'_i	n'_j
(i)	> 0	< 0
(ii)	> 0	$= 0$
(iii)	$= 0$	< 0
(iv)	> 0	> 0
(v)	< 0	< 0

In reforms of types (ii) and (iii), a change in I only affects the stake of one interest group. The incidence of the proposed policy reform in these cases is therefore partial. A change in I can be interpreted as a more (less) restrained government intervention if it reduces (increases) the affected stake. Clearly, such a change also affects the stake-asymmetry between the contestants. For example, in a type-(ii) reform where $i = H$, an increase in I represents a less restrained intervention that increases the asymmetry between the stakes of the contestants.

In the remaining types the incidence of the proposed reform is complete because a change in I affects the stakes of the two contestants. In reforms of type (i) a change in the policy instrument I has opposite effects on the stakes of the two players. If $i = H$, such a change positively affects the asymmetry between the stakes of the contestants. If $i = L$, the asymmetry between the stakes is inversely related to a change in I . In both cases a change in the proposed policy can be considered as a more restrained government intervention if it reduces the sum of the stakes $n_L + n_H$.

In reforms of types (iv) and (v) a change in I has a similar positive or negative effect on the stakes of the players. In both of these cases, therefore, such a change can be unambiguously interpreted as a more restrained or a less restrained government intervention. In these cases, the effect of a change in I on the stake-asymmetry depends on the relationship between the elasticities of the stakes with respect to I . Specifically, the effect of a change in I on n_L/n_H depends on whether $\frac{\eta_L}{\eta_H}$ is greater or smaller than 1, where $\eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j}$, $j = L, H$. In a type-(iv) reform the asymmetry in the stakes is positively related to a change in I if $\frac{\eta_L}{\eta_H} < 1$. In a type-(v) reform the asymmetry in the stakes is positively related to a change in I if $\frac{\eta_L}{\eta_H} > 1$.

Usually, a change in public policy affects the stakes of the two contestants. The applicability of the corresponding reforms of types (i), (iv) and (v) is illustrated by the following examples.

Monopoly price regulation: Several authors (e.g., Baik (1999), Ellingsen (1991), Epstein and Nitzan (2003b), Fabella (1995) and see discussion in Part E) have pointed out that consumers oppose government protection of a monopoly in attempting to defend their surplus. In this example the firm is the LB player and the consumers' are the HB player. When the monopoly price ranges between the competitive price and the profit-maximizing monopoly price, a change in the proposed price positively affects the stakes of both players (the reform is of type (iv)).

Public-good Provision: The government considers building a park on the border of a residential neighborhood. In order to finance the project, a general tax is levied on all residents of the country who may benefit from the provision of the proposed park. However, the local residents, the individuals who reside close to the park, are subjected to another "tax": the negative externalities (increased congestion, noise, etc.) associated with living close to a public park. If the collected taxes are allocated to the building of the park, an increase in the lump-sum tax or in the tax rate implies an increase in the size of the park. Such a reform can be of type (iv). Now assume that beyond a certain point, an increase in the size of the park does not increase the benefit of the general public. In such a case, an increase in taxes and, in turn, in the size of the park may reduce the benefit associated with the approval of the proposed change in the tax for the nonlocal residents. Such a reform can be of type (i) or type (ii). Finally, suppose that the collected taxes are used to finance the park as well as to compensate the local residents for the negative externalities. In such a case it is possible that an increase in the proposed tax results in a decrease in the benefit associated with the rejection of the proposed tax change for the local residents (the reform is of type (v)).

Protection by Tariff: The study of trade-policy determination has often applied rent-seeking or contest models, see Hillman (1989) and Mueller (2003). The producer is the LB player and the representative of the consumers is the HB player. An increase in the proposed tariff increases the benefit of the consumers from disapproval of the proposed tariff change and increases the benefit of the local producers from approval of the proposed tariff.⁷¹

Clearly, numerous other applications come to mind. In fact, any setting where public policy affects the payoffs of two agents (interest groups), such that one agent is interested in the approval of the proposed policy and the other agent supports the rejection of that proposal can serve as an illustration

⁷¹ If the policy instrument is a protective general tariff – which is imposed on all imported products including the imported inputs, the representatives of the local producers and the consumers are, respectively, the LB and HB players. In such a case, rejection of a proposed increase in the tariff increases the net benefit of the local consumers. Approval of such a proposed increase in the protective tariff may increase or decrease the benefit (the rent) of the local producers. The latter possibility occurs when production costs become sufficiently high due to the increased tariff on the imported inputs. Under this latter possibility, the proposed reform is of type (i). Otherwise, we are back to a type-(iv) reform.

to our model. One can easily construct other examples assuming, for example, that the policy instrument is the quality of a public good provided by the government, the degree of privatization of a particular publicly owned company or income transfer from one agent (interest group) to another.

3 Public Policy, Efforts and Winning Probabilities

The effort exerted in the public-policy contest deserves attention because, if it is conceived as wasteful resources, it can be interpreted as social costs and, therefore, serve as a measure of inefficiency (note that the misallocation of resources is the true social cost, while the effort may be a transfer). Understanding how public policy affects this effort, which is often referred to as rent dissipation, is the main goal of the proposed theory of public-policy contests.

By differentiation of the first-order conditions (see Eq. (C.2)), we get that the Nash equilibrium efforts satisfy the following conditions:

$$\frac{\partial x_i^*}{\partial I} = \frac{\frac{\partial \Delta_i}{\partial x_j} \frac{\partial \Delta_j}{\partial I} - \frac{\partial \Delta_j}{\partial x_i} \frac{\partial \Delta_i}{\partial I}}{\frac{\partial \Delta_i}{\partial x_i} \frac{\partial \Delta_j}{\partial x_j} - \frac{\partial \Delta_j}{\partial x_i} \frac{\partial \Delta_i}{\partial x_j}}, \quad i \neq j, \quad i, j = L, H. \quad (C.4)$$

We thus obtain that:

$$\frac{\partial x_i^*}{\partial I} = \frac{n_i \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial \text{Pr}_j}{\partial x_j} \frac{\partial n_j}{\partial I} - n_j \frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial \text{Pr}_i}{\partial x_i} \frac{\partial n_i}{\partial I}}{n_i n_j \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right)}, \quad i \neq j, \quad i, j = L, H. \quad (C.5)$$

Rewriting Eq. (C.5) together with Eq. (C.3), we obtain the fundamental equation that generates all the comparative statics results:

$$\frac{\partial x_i^*}{\partial I} = \frac{1}{B} \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j n_i - \frac{1}{B} \frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \eta_i n_j, \quad i \neq j, \quad i, j = L, H, \quad (C.6)$$

where

$$B = In_i n_j \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right)$$

and all second-order partial derivatives are computed at the Nash equilibrium (x_H^*, x_L^*) . The first term in Eq. (C.6) represents the strategic rival's-stake ("substitution") effect. The sign of this term is equal to the sign of $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j$. The second term represents the own-stake ("income") effect. The sign of this term is equal to the sign of η_i . By assumption, $\frac{\partial^2 \text{Pr}_i(x_i, x_j)}{\partial x_i^2} < 0$ and, by Eq. (C.1), $\frac{\partial^2 \text{Pr}_i(x_i, x_j)}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j(x_j, x_i)}{\partial x_i \partial x_j} < 0$. Hence, $B > 0$.

a Partial Incidence: Policy Reforms Affecting a Single Stake

When a change in I only affects the stake of one of the contestants, as in reform types (ii) and (iii), η_i or η_j is equal to zero and Eq. (C.6) reduces to

$$\frac{\partial x_i^*}{\partial I} = \frac{1}{B} \left(\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j n_i \right) \quad \text{or} \quad \frac{\partial x_i^*}{\partial I} = \frac{1}{B} \left(-\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \eta_i n_j \right) \quad \forall i \neq j, i, j = L, H \quad (\text{C.7})$$

In such a case the change in player i 's effort corresponding to the change in n_j is equal to the strategic rival's-stake ("substitution") effect, when $i \neq j$, or to the strategic own-stake ("income") effect, when $i = j$. The former effect is ambiguous, depending on the sign of the cross-partial derivative of the CSF. The latter effect is clear-cut, due to our assumption that the marginal winning probability of a contestant is declining in his own effort.

In case (ii) with $i = H$ and case (iii) with $i = L$,

$$\frac{\partial x_H^*}{\partial I} = \frac{1}{B} \left(-\frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \eta_H n_L \right) \quad \text{and} \quad \frac{\partial x_L^*}{\partial I} = \frac{1}{B} \left(\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} \eta_H n_L \right).$$

In cases (iii) with $i = H$ and case (ii) with $i = L$,

$$\frac{\partial x_H^*}{\partial I} = \frac{1}{B} \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} \eta_L n_H \right) \quad \text{and} \quad \frac{\partial x_L^*}{\partial I} = \frac{1}{B} \left(-\frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \eta_L n_H \right).$$

We therefore obtain

Proposition C1: *In case (ii) with $i = H$ and case (iii) with $i = L$,*

$$\text{Sign} \left(\frac{\partial x_H^*}{\partial I} \right) = \text{Sign}(\eta_H) \quad \text{and} \quad \text{Sign} \left(\frac{\partial x_L^*}{\partial I} \right) = \text{Sign} \left(\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} \eta_H \right).$$

In cases (iii) with $i = H$ and case (ii) with $i = L$,

$$\text{Sign} \left(\frac{\partial x_L^*}{\partial I} \right) = \text{Sign}(\eta_L) \quad \text{and} \quad \text{Sign} \left(\frac{\partial x_H^*}{\partial I} \right) = \text{Sign} \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} \eta_L \right).$$

Proposition C1 directly yields the following general comparative-statics result that focuses on the sensitivity of a contestant's effort to a change in his or his rival's stake:

Corollary C1.1: *In cases (ii) and (iii), $\frac{\partial x_H^*}{\partial n_H} > 0$, $\frac{\partial x_L^*}{\partial n_L} > 0$,*

$$\text{Sign} \left(\frac{\partial x_H^*}{\partial n_L} \right) = \text{Sign} \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} \right) \quad \text{and} \quad \text{Sign} \left(\frac{\partial x_L^*}{\partial n_H} \right) = \text{Sign} \left(\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} \right).$$

By this first corollary, under our general CSF, the effort exerted by a contestant is positively related to his stake. That is, the strategic own-stake (“income”) effect is always positive (effort of every player is a “normal good”). In contrast, the effort exerted by a player can be positively or negatively related to the stake of his rival. It can also be independent of the rival’s stake. When the equilibrium marginal winning probability of a contestant is positively (negatively) related to his rival’s effort, his strategic substitution effect is positive (negative). Following Bulow, Geanakoplos and Klemperer (1985), in such a case we say that a contestant’s effort is a strategic complement (substitute) to his rival’s effort. When the cross-partial derivative of the CSF is equal to zero the contestants’ efforts are independent. Note that, from Eq. (C.1), in our setting the strategic substitution effects are asymmetric; if a player’s effort is a strategic complement to his opponent’s effort, then his opponent’s effort is a strategic substitute to his effort.

In the symmetric case where, $\forall x_H$ and x_L , $\Pr_H(x_L, x_H) = 1 - \Pr_H(x_H, x_L)$, there exists a pure strategy Nash equilibrium, such that $x_H^* > x_L^*$ and, in equilibrium, $\text{Sign}\left(\frac{\partial^2 \Pr_H}{\partial x_H \partial x_L}\right) = \text{Sign}(x_H^* - x_L^*) > 0$, which implies that $\frac{\partial^2 \Pr_L}{\partial x_L \partial x_H} < 0$. Hence, by Corollary C1.1,

Corollary C1.2: *In cases (ii) and (iii), if, $\forall x_H$ and x_L ,*

$$\Pr_H(x_L, x_H) = 1 - \Pr_H(x_H, x_L),$$

then

$$\frac{\partial x_H^*}{\partial n_H} > 0, \quad \frac{\partial x_L^*}{\partial n_L} > 0, \quad \frac{\partial x_H^*}{\partial n_L} > 0 \quad \text{and} \quad \frac{\partial x_L^*}{\partial n_H} < 0.$$

This second corollary generalizes the result obtained by Nti (1999) where $\Pr_i$ is assumed to take the particular symmetric logit form, as in Tullock (1980), $\Pr_i(x_i, x_j) = \frac{x_i^r}{x_i^r + x_j^r}$, $i = L, H$. In this special case of symmetric lobbying abilities of the contestants, the HB player can be referred to as the favored player and the LB player can be referred to as the underdog, see Dixit (1987). Corollary C1.2 establishes that the effort of the favored player increases with both his own stake (valuation of the contested prize) and with the stake (prize valuation) of the underdog. The effort of the underdog increases with his stake (prize valuation), but decreases with the stake (prize valuation) of the favored player.

Another more general asymmetric form of the logit CSF is: $\Pr_H = \frac{\sigma h(x_H)}{\sigma h(x_H) + h(x_L)}$, where $\sigma > 0$, $h(0) \geq 0$ and $h(x_i)$ is increasing in x_i ,⁷² see Baik (1994). Here, the parameter σ represents the asymmetry between the

⁷² In this special case we keep the assumption that a contestant’s marginal winning probability is declining in his effort. This requires additional assumptions on the first and second derivatives of the function $h(x_i)$.

lobbying abilities of the two players. Note that when $\sigma < 1$, the HB player has an ability disadvantage relative to the LB player. It can be shown that under this particular CSF, $\text{Sign}(\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H}) = \text{Sign}(\text{Pr}_L - \text{Pr}_H)$ and, therefore, for some $\sigma^* < 1$, $\text{Pr}_L = \text{Pr}_H = 1/2$ and $\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} = \frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} = 0$. From Corollary C2.1 we get

Corollary C1.3: *In cases (ii) and (iii), if $\text{Pr}_H = \frac{\sigma h(x_H)}{\sigma h(x_H) + h(x_L)}$, where $\sigma > 0$, $h(0) \geq 0$ and $h(x_i)$ is increasing in x_i , then*

$$\frac{\partial x_H^*}{\partial n_H} > 0, \quad \frac{\partial x_L^*}{\partial n_L} > 0 \quad \text{and} \quad \frac{\partial x_L^*}{\partial n_H} \geq 0 \Leftrightarrow \frac{\partial x_H^*}{\partial n_L} \leq 0 \Leftrightarrow \text{Pr}_H \leq 1/2.$$

This third corollary generalizes Proposition 1 in Baik (1994).

b Complete Incidence: Policy Reforms Affecting Both Stakes

When a change in I affects the stakes of the two contestants, as in reform types (i), (iv) and (v), η_L and η_H are positive or negative. From the fundamental Eq. (C.6), when the contestants' efforts are independent, the sensitivity of every contestant's effort with respect to a proposed policy reform is always unequivocal. When the contestants' efforts are not independent, the sensitivity of the effort of one contestant with respect to a proposed policy reform is always unequivocal because the sign of his strategic rival's-stake ("substitution") effect is equal to the sign of his strategic own-stake ("income") effect. The sensitivity of his opponent's effort with respect to the proposed policy reform is ambiguous, depending on whether his strategic own-stake ("income") effect is larger than, equal to or smaller than his strategic rival's-stake ("substitution") effect. Using Eq. (C.6) we thus get

Proposition C2: *In cases (i), (iv) and (v),*

(a) *If $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} = 0$, then $\text{Sign}\left(\frac{\partial x_i^*}{\partial I}\right) = \text{Sign}(\eta_i)$.*

(b) *If $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \neq 0$, then*

$$(1) \quad \text{Sign}\left(\frac{\partial x_i^*}{\partial I}\right) = \text{Sign}(\eta_i) \Leftrightarrow \text{Sign}\left(\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j\right) = \text{Sign}(\eta_i) \quad \text{and}$$

$$(2) \quad \frac{\partial x_j}{\partial I} > 0 \Leftrightarrow -\frac{\partial^2 \text{Pr}_i}{\partial x_i^2} \eta_j n_i < -\frac{\partial^2 \text{Pr}_j}{\partial x_j \partial x_i} \eta_i n_j.$$

By Proposition C2(a), if the contestants are symmetric in terms of their equilibrium abilities, then the strategic rival's-stake ("substitution") effects

vanish (efforts are independent) and the positive strategic own-stake (“income”) effect solely determines the direct effect of a change in I on a contestant’s effort. In the perfectly symmetric case where, $\forall x_H$ and x_L , $\Pr_H(x_L, x_H) = 1 - \Pr_H(x_H, x_L)$ and $n_H = n_L = n$, there exists a symmetric pure strategy Nash equilibrium, $x_H^* = x_L^*$, and $\frac{\partial^2 \Pr_L}{\partial x_L \partial x_H} = \frac{\partial^2 \Pr_H}{\partial x_H \partial x_L} = 0$, see Dixit (1987). Hence, by Proposition C2(a),

Corollary C2.1: *In cases (i), (iv) and (v), if, $\forall x_H$ and x_L ,*

$$\Pr_H(x_L, x_H) = 1 - \Pr_H(x_H, x_L) \text{ and } n_H = n_L = n, \text{ then } \frac{\partial x_H^*}{\partial n} = \frac{\partial x_L^*}{\partial n} > 0.$$

This corollary generalizes a similar result established by Nti (1999), assuming a particular CSF of the logit form.

Proposition C2(b) can be used to determine the sensitivity of the contestants’ efforts in all possible situations corresponding to the three types of policy reforms affecting both stakes and $\frac{\partial^2 \Pr_i}{\partial x_i \partial x_j} \neq 0$. Consider, for example, a type-(i) policy reform and suppose that $\frac{\partial^2 \Pr_H}{\partial x_H \partial x_L} < 0$, that is, the effort of the HB player is a strategic substitute of the effort of the LB player. By Proposition C2(b), in such a case,

$$\frac{\partial x_H^*}{\partial I} > 0 \quad \text{and} \quad \frac{\partial x_L}{\partial I} < 0 \Leftrightarrow -\frac{\partial^2 \Pr_H}{\partial x_H^2} \eta_L n_H > -\frac{\partial^2 \Pr_L}{\partial x_L \partial x_H} \eta_H n_L.$$

Notice that by Proposition C2(b), the conditions resolving the ambiguity regarding the sensitivity of j ’s effort to a proposed policy reform involve the three elements of asymmetry between the contestants introduced in Sects. 2 and 3:

$$A_j^1 = \frac{\partial^2 \Pr_j}{\partial x_j \partial x_i} \bigg/ \left(\frac{\partial^2 \Pr_i}{\partial x_i^2} \right), \quad A_j^2 = \frac{n_j}{n_i} \quad \text{and} \quad A_j^3 = \frac{\eta_j}{\eta_i}.$$

In fact, the comparison between the strategic rival’s-stake (“substitution”) effect and the strategic own-stake (“income”) effect depends on the relationship between the ability-asymmetry represented by A_j^1 and the normalized stake-asymmetry represented by $\frac{A_j^3}{A_j^2} = \frac{\eta_j/n_i}{\eta_i/n_i}$. Specifically, by Proposition C2, it can be easily verified that

Corollary C2.2:

$$\begin{aligned} \frac{\partial x_i^*}{\partial I} < 0 &\Rightarrow \frac{\partial x_j^*}{\partial I} > 0 \Leftrightarrow A_j^1 > \frac{A_j^3}{A_j^2}, \\ \frac{\partial x_i^*}{\partial I} > 0 &\Rightarrow \frac{\partial x_j^*}{\partial I} > 0 \Leftrightarrow A_j^1 < \frac{A_j^3}{A_j^2}. \end{aligned}$$

To illustrate the economic interpretation of this corollary, suppose, for example, that the HB player has a disadvantage in terms of his equilibrium ability (marginal winning probability), that is, $\frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} < 0$. By Proposition C2, when the proposed reform is of type (iv), an increase in I induces the LB player to increase his effort. In this case, the HB player's effort is a strategic substitute to the LB player's effort, so the strategic substitution effect induces the HB player to reduce his effort. However, his effort is a "normal" good, so the increase in his stake induces him to increase his effort. The latter effect is dominant and the HB player also increases his effort, if his advantage in terms of stakes, which is represented by the stake-asymmetry measure $\frac{A_H^3}{A_H^2} = \frac{\eta_H/n_H}{\eta_L/n_L}$ is larger than his ability disadvantage, which is represented by the ability-asymmetry measure $A_H^1 = \frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} / \left(\frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \right)$. Similar economic interpretations can be given to the conditions in Corollary C2.2 in all other possible situations corresponding to the three types of reforms affecting the two players, given that the HB player is advantaged or disadvantaged in terms of his equilibrium ability.

In our setting, the response of one contestant to a change in the proposed policy is ambiguous. A change in I may therefore affect the aggregate efforts of the contestants differently. This implies that when $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \neq 0$, under any type of a proposed reform the effect of a change in I on the aggregate effort $X^* = x_H^* + x_L^*$ is ambiguous. Since $\frac{\partial X^*}{\partial I} = \frac{\partial x_H^*}{\partial I} + \frac{\partial x_L^*}{\partial I}$, from Eq. (C.7) and Corollary C1.1 we get:

Proposition C3:

$$\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} > 0 \Rightarrow \frac{\partial X^*}{\partial n_j} > 0 \quad \text{and} \quad \frac{\partial X^*}{\partial n_i} < 0 \Leftrightarrow -\frac{\partial^2 \text{Pr}_j}{\partial x_i^2} \eta_i n_j > \frac{\partial^2 \text{Pr}_j}{\partial x_j \partial x_i} \eta_i n_j.$$

That is, if i 's effort is a strategic complement to j 's effort, then the aggregate effort increases with an increase in j 's stake. The aggregate effort also increases with i 's stake, if the positive strategic own-stake ("income") effect of player i is larger than the negative strategic rival's-stake ("substitution") effect of player j .

Let us finally consider how a change in the proposed policy affects the performance of the contestants; namely, their probabilities of winning the contest:

$$\frac{d\text{Pr}_L^*}{dI} = \frac{\partial \text{Pr}_L}{\partial x_L^*} \frac{\partial x_L^*}{\partial I} + \frac{\partial \text{Pr}_L}{\partial x_H^*} \frac{\partial x_H^*}{\partial I}. \quad (\text{C.8})$$

Note that

$$\frac{\partial \text{Pr}_L}{\partial x_H^*} = -\frac{\partial \text{Pr}_H}{\partial x_H^*}, \quad \frac{\partial^2 \text{Pr}_L}{\partial x_H^* \partial x_L^*} = -\frac{\partial^2 \text{Pr}_H}{\partial x_H^* \partial x_L^*} \quad \text{and} \quad \frac{\partial \text{Pr}_i}{\partial x_i} = \frac{1}{n_i(I)}.$$

Thus we may rewrite Eq. (C.8) as:

$$\begin{aligned} & \frac{d\text{Pr}_L^*}{dI} \\ &= \frac{1}{B n_L n_H} \left(n_L n_H \frac{\partial^2 \text{Pr}_H}{\partial x_L \partial x_H} (\eta_H + \eta_L) - \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \eta_L n_H^2 - \frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \eta_H n_L^2 \right) \right). \end{aligned} \quad (\text{C.9})$$

This gives

Proposition C4 :

$$\frac{d\text{Pr}_L^*}{dI} > 0 \quad \text{if} \quad \frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} (\eta_H + \eta_L) > \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \eta_L \frac{n_H}{n_L} - \frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \eta_H \frac{n_L}{n_H} \right).$$

By this Proposition we get:

Corollary C4.1:

- (a) Under a type-(i) reform with $i = H$, $\frac{d\text{Pr}_L^*}{dI} < 0$ if $\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} \leq 0$;
- (b) Under a type-(iv) reform with $i = L$, $\frac{d\text{Pr}_L^*}{dI} > 0$ if $\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} \geq 0$;
- (c) Under a type-(iv) reform, $\frac{d\text{Pr}_L^*}{dI} \geq 0$ if $\frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \Big/ \left(\frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \right) \geq \frac{\eta_H n_L^2}{\eta_L n_H^2}$
and $\frac{\partial^2 \text{Pr}_L}{\partial x_L \partial x_H} \geq 0$;
- (d) Under a type-(v) reform, $\frac{d\text{Pr}_L^*}{dI} > 0$ if $\frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \Big/ \left(\frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \right) \leq \frac{\eta_H n_L^2}{\eta_L n_H^2}$
and $\frac{\partial^2 \text{Pr}_L}{\partial x_H \partial x_L} \geq 0$.

Under a type-(i) reform with $i = H$, an increase in the proposed policy increases the stake-asymmetry between the contestants. In other words, such a reform tends to increase the disadvantage of the LB player in terms of stakes. If he is also disadvantaged in terms of ability (marginal contest-winning probability), then, by Corollary C4.1(a), the proposed increase in I reduces both his effort (see Proposition C2) and his probability of winning the contest. Notice that this is the case, despite the possible decline in the effort exerted by the HB player. Under a type-(i) reform with $i = L$, an increase in the proposed policy reduces the stake-asymmetry between the contestants. That is, the LB player becomes less disadvantaged in terms of the contest stakes. If he also has a disadvantage in terms of ability (marginal contest-winning probability), then, by Corollary C4.1 (b), the proposed increase in I increases his probability of winning the contest, despite the fact that his effort need not rise (see Proposition C2).

4 Summary

Government intervention often gives rise to contests in which the possible prizes are determined by the status quo and some new public-policy proposal. Since a proposed policy reform has different implications for different interest groups, these groups make efforts to affect in their favor the probability of approval of the proposed public policy. A change in the proposed policy modifies the stakes of the interest groups who take part in the contest on the approval or rejection of the proposed policy. Such a change has two effects on the nature of the public-policy contest. It affects the degree of competition by increasing or decreasing the sum of the potential prizes (stakes) and by increasing or decreasing the asymmetry between the contestants' stakes (prize valuations). What determines the contestants' effort response to the proposed policy reform and, in turn, the change in their probability of winning the contest, are three asymmetry factors: The existing stake-asymmetry; the asymmetry in the effect of a proposed reform on the existing stakes; and the ability-asymmetry: the asymmetry in the effect of a change in a contestant's effort on his own and on his opponent's marginal probability of winning the contest.

We studied a general class of two-player public-policy contests and examined the effect of a change in the proposed policy, a change that may affect the payoffs of one or both contestants, on their effort and performance. Proposition C1 and its corollaries generalize the comparative statics results of Baik (1994) and Nti (1999) that focus on the effect of changes either in the value of a contest prize in symmetric contests or in one of the contestants' valuation of the prize in asymmetric contests, assuming special forms of our general CSF. Propositions C2–C4 present the comparative statics results in the extended setting where the proposed public-policy determines the prize system: the stakes of the two interest groups. All the results hinge on a fundamental equation that stresses the significance of the relationship between the strategic own-stake (“income”) effects and the strategic rival's-stake (“substitution”) effects corresponding to any change in the proposed public policy. This fundamental equation clarifies the role of the three types of asymmetry between the contestants in determining the effect of a change in the contestants' payoffs on their effort and performance.

In the political economy literature substantial attention has been paid to the endogenous determination of policy proposals by two competing political parties. An important issue is how policy proposals map into policy outcomes. Typically, the answer to this question is provided on the basis of a representative–democracy model, where the equilibrium proposals hinge on the party ideologies, the mapping of proposals into policy outcomes, the information that politicians and the voters have on this mapping and on the voters' preferences. For example, Cukierman and Tommasi (1998) develop a framework where the politician in office has better information than the voters about the way in which policy maps into outcomes, identifying circumstances

under which policies are proposed and implemented by “unlikely” political parties rather than by parties whose ideology favors such policies. In our setting, the status quo and the proposed challenging policy are two competing policies that are considered to be parameters and not endogenous variables. The proposed policy in our study can be determined endogenously by a third player; a bureaucrat or an incumbent politician, in an extended contest, as in Chapter IV. In such a case, the proposed policy is not the result of political competition between two parties, but rather is determined by a bureaucrat who takes into account the contest between the interest groups and, in particular, their expected lobbying efforts and benefits. In Chapter VI we showed that in such an extended model it is possible that the bureaucrat proposes an atypical extreme policy that is not a compromise between the most preferred policies of the interest groups. But such situations are not due to asymmetric information about the mapping of policy instruments into policy outcomes, as in Cukierman and Tommasi (1998), because in our setting, by assumption, a proposed policy is always implemented, provided that it is approved by the ruling politician, and this is common knowledge for the interest groups. Rather, in the extended setting an extreme policy can be proposed because of the special significance the bureaucrat assigns to the anticipated lobbying outlays directed by the contestants to the government.

VIII

Prizes (Size and Distribution) and Efforts

A major concern in the contest literature has been the issue of how do changes in the parameters of the contest (number, valuations and abilities of the contestants and the nature of the information they have) affect their equilibrium efforts and the extent of relative prize dissipation, Hillman and Riley (1989), Hurley and Shogren (1998), Konrad (2002), Nitzan (1994) and Nti (1997). In addition, attention has been paid to the effect of changes in these parameters on the contestants' expected payoffs, Baik (1994), Gradstein (1995) and Nti (1997). The main concern of this chapter is further clarification of the effect of changes in public policy that determine the prize system on the total effort invested by the contestants. In particular, we wish to clarify why a more restrained government intervention that directly reduces the prizes of the two contestants may have the “perverse” effect of increasing their total exerted efforts. Our results hinge on the fundamental equation of the previous chapter VI, that decomposes the total effect on individual effort into two subeffects that correspond to the change in the two measures of intensity of competition. Using this equation, we show that the “prize-distribution effect” is always larger than the “size effect” (size of the sum of the prizes). This result implies that when there is a change in both the size of the prizes and in their distribution, the direct incentives due to the change in the contestant's relative share is larger than the indirect incentives due to the relative change in the sum of the contest prizes. In particular, a contest on part of the GNP is going to affect waste (lobbying efforts) more through the contestants' direct distributional (inequality) incentives than through their indirect size (the size of the contested “cake”) incentives.

1 The Public-policy Contest

As in Chapter IV, there are two risk-neutral interest groups (L and H) that are affected differently by the approval and rejection of a proposed policy. The

interest groups engage in a complete-information contest that determines the probabilities of approval and rejection of the proposed policy.⁷³

Player i 's preferred policy is approved in probability $\Pr_i n_i$. n_i denotes the stake of player i . A player's stake is secured when he wins the contest, that is, when his preferred policy is the outcome of the contest. For one player the desirable outcome is associated with the approval of the proposed policy, I , while for the other player the desirable outcome is realized when the proposed policy is rejected. x_i denotes the effort of the risk-neutral player i . The expected net payoff (surplus) of interest group i is as given in Eq. (A.3):

$$E(w_i) = \Pr_i n_i(I) - x_i. \quad (\text{A.3})$$

As already noted, the ability of a contestant j to convert effort into probability of winning the contest can be represented by the marginal effect of a change in his effort on his winning probability. Our subsequent analysis relates to all of the five possible types of public-policy effects on the stakes of the interest groups as presented in Table C.1 in Chapter VII:

Table C.1.

Type	n'_i	n'_j
(i)	> 0	< 0
(ii)	> 0	$= 0$
(iii)	$= 0$	< 0
(iv)	> 0	> 0
(v)	< 0	< 0

As explained in the previous chapter, in reforms of types (ii) and (iii), a change in I only affects the stake of one interest group. The incidence of the proposed policy reform in these cases is therefore partial. A change in I can be interpreted as a more (less) restrained government intervention if it reduces (increases) the affected stakes. Clearly, such a change also affects the stakes-asymmetry between the contestants. For example, in a type-(ii) reform where $i = H$, an increase in I represents a less restrained intervention that increases the asymmetry between the stakes of the contestants.

In the remaining types the incidence of the proposed reform is complete because a change in I affects the stakes of the two contestants. In reforms of type (i) a change in the policy instrument I has opposite effects on the stakes of the two players. If $i = H$, such a change positively affects the asymmetry between the stakes of the contestants. If $i = L$, the asymmetry between the

⁷³ Modeling the contestants as single agents presumes that they have already solved the collective action problem.

stakes is inversely related to a change in I . In both cases a change in the proposed policy can be considered as a more restrained government intervention if it reduces the sum of the stakes $n_L + n_H$.

In reforms of types (iv) and (v) a change in I has a similar positive or negative effect on the stakes of the players. In both of these cases, therefore, such a change can be unambiguously interpreted as a more restrained or a less restrained government intervention. In these cases the effect of a change in I on the stakes-asymmetry depends on the relationship between the elasticities of the stakes with respect to I . Specifically, the effect of a change in I on n_L/n_H depends on whether $\frac{\eta_L}{\eta_H}$ is greater or smaller than 1, where $\eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j}$, $j = L, H$. In a type-(iv) reform the asymmetry in the stakes is positively related to a change in I if $\frac{\eta_L}{\eta_H} < 1$. In a type-(v) reform the asymmetry in the stakes is positively related to a change in I if $\frac{\eta_L}{\eta_H} > 1$.

2 Reduced Prizes and Increased Effort

In Eq. (C.5) we established that the Nash equilibrium efforts satisfy:

$$\frac{\partial x_i^*}{\partial I} = \frac{n_i \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial \text{Pr}_j}{\partial x_j} \frac{\partial n_j}{\partial I} - n_j \frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial \text{Pr}_i}{\partial x_i} \frac{\partial n_i}{\partial I}}{n_i n_j \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right)}, \quad i \neq j, \quad i, j = L, H, \quad (\text{C.5})$$

where $X^* (= x_L^* + x_H^*)$ represents the rent dissipation. From Eqs. (C.1)–(C.3) and (C.5),

$$\frac{\partial X^*}{\partial I} = \frac{1}{B} \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} (\eta_L n_H - \eta_H n_L) - \left(\frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \eta_L n_H + \frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \eta_H n_L \right) \right), \quad (\text{C.10})$$

where

$$B = I n_i n_j \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right) > 0, \quad \eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j}$$

and all second-order partial derivatives are computed at the Nash equilibrium (x_H^*, x_L^*) . The first term in Eq. (C.10) represents the sum of the two contestants' strategic rival's-stake effects. The sign of player i 's strategic rival's-stake effect is equal to the sign of $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j$. The second term represents the sum of the two contestants' own-stake effects. The sign of player i 's own-stake effect is equal to the sign of η_i . By assumption, $\frac{\partial^2 \text{Pr}_i(x_i, x_j)}{\partial x_i^2} < 0$ and, by Eq. (C.1), $\frac{\partial^2 \text{Pr}_i(x_i, x_j)}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j(x_j, x_i)}{\partial x_i \partial x_j} < 0$. Hence, $B > 0$.

Proposition C5:

$$\frac{\partial X^*}{\partial I} > 0 \Leftrightarrow \frac{\partial^2 \text{Pr}_H}{\partial x_H \partial x_L} (\eta_L n_H - \eta_H n_L) > \frac{\partial^2 \text{Pr}_H}{\partial x_H^2} \eta_L n_H + \frac{\partial^2 \text{Pr}_L}{\partial x_L^2} \eta_H n_L.$$

This Proposition enables us to analyze how changes in the stakes, both stakes or just one stake, affect the total rent-seeking efforts. For example, when both stakes increase, then $n'_L, n'_H > 0$ and thus $\eta_L \eta_H > 0$. However, if there is no change in the higher stake, but there is a decrease in the lower stake, then $n'_L < 0$ and, $n'_H = 0$ and, in turn, $\eta_L < 0$ and $\eta_H = 0$. The Proposition therefore covers all the different possibilities of changes in the stakes as presented in the table above. The conditions resolving the ambiguity regarding the sensitivity of the rent dissipation to a proposed policy reform involve three elements of asymmetry between the contestants:

$$A_j^1 = \frac{\partial^2 \text{Pr}_j}{\partial x_j \partial x_i} \bigg/ \left(\frac{\partial^2 \text{Pr}_i}{\partial x_i^2} \right), \quad A_j^2 = \frac{n_j}{n_i} \quad \text{and} \quad A_j^3 = \frac{\eta_j}{\eta_i}.$$

The condition clarifies the role of stakes-asymmetry and ability-asymmetry between the contestants. It implies that even under the most restrained policy reform, where $n'_H < 0$ and $n'_L < 0$, a reform that reduces the stakes of the two contestants, it is possible that the two contestants are induced to increase their aggregate effort. This occurs when the negative rival's-stake effect, $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j n_i$, of the contestant who is induced to increase his effort more than counterbalances the sum of the two positive own-stake effects, $\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \eta_i n_j$, and his opponent's positive rival's stake effect. Alternatively, if the L player's effort is a substitute to the H player's effort, a sufficiently high reduction in the normalized stakes-asymmetry, a sufficiently high value of A_H^3 / A_H^2 , would induce the L player to increase his effort such that aggregate effort is increased. When the H player's effort is a substitute for the L player's effort, a sufficiently small reduction in the normalized stakes-asymmetry, a sufficiently small value of A_H^3 / A_H^2 , would induce the H player to increase his effort such that aggregate effort is increased.

An Example: The ambiguity of the counterintuitive effect of a change in both stakes on the efforts of the contestants is illustrated below using a plausible and widely used contest success function. Specifically, we present a situation where, under the same contest success function, a decrease in the stakes of the contestants may result in an increase or in a decrease in rent dissipation, X . Consider a generalized Tullock's (1980) lottery logit contest success function (CSF) (see Gradstein, 1995, and Nti, 1997) where $\text{Pr}_L = \frac{x_L}{dx_H + x_L}$, $\text{Pr}_H = \frac{dx_H}{dx_H + x_L}$ and $x_H, x_L, d > 0$. By the first-order conditions we obtain that in equilibrium $x_L^* = \frac{dn_H n_L^2}{(dn_H + n_L)^2}$ and $x_H^* = \frac{dn_L n_H^2}{(dn_H + n_L)^2}$. Therefore, in equilibrium

the total rent-seeking efforts are equal to:

$$X^* = x_L^* + x_H^* = \frac{dn_L n_H (n_L + n_H)}{(dn_H + n_L)^2}.$$

In this case

$$\frac{\partial X^*}{\partial n_L} > 0 \quad \text{and} \quad \frac{\partial X^*}{\partial n_H} \begin{matrix} > \\ = 0 \\ < \end{matrix} \quad \text{iff} \quad n_L \begin{matrix} > \\ = \\ < \end{matrix} (d-2)n_H.$$

This means that a decrease in the lower stake n_L reduces the effort of player L , while a decrease in the higher stake n_H , may increase or decrease the effort of player H . The effect of a simultaneous decrease of both stakes on the equilibrium total rent-seeking efforts X^* is therefore ambiguous. Using the conditions stated in the Proposition, we can present cases under which such a simultaneous decrease in both stakes reduces or increases the rent-seeking efforts. For example, let $d = 100$, $n_L^0 = 100$ and $n_H^0 = 1.000$, in which case $X^* = 1.0978$. A decrease in the stakes such that $n_L^1 = 90$ and $n_H^1 = 100$ increases the efforts to $X^* = 1.6796 > 1.0978$. However, if at the initial case $d = 100$, $n_L^0 = 100$ and $n_H^0 = 110$, in which case $X^* = 1.874$, a simultaneous decrease in the stakes such that $n_L^1 = 90$ and $n_H^1 = 100$ results in reduced efforts as $X^* = 1.6796 < 1.874$. To sum up, this example demonstrates that changing both stakes in the same direction may increase or decrease the rent dissipation. The conditions that insure a decrease or an increase are those stated in the Proposition.

3 Size and Distribution of Prizes and Efforts

The intensity of competition in contests is affected by the sum of the awarded prizes and by the prize distribution between the contestants. It seems that the larger the sum of the prizes and the more symmetric its distribution, the more intense is the competition; that is, the larger the efforts incurred by the contestants. In this chapter we study the general class of such two-player variable contests and examine their effect on the contestants' efforts.

The efforts exerted in the contest deserve attention, first, because they can be interpreted as social costs and, second, because they can serve as a measure of an interest-group involvement in the contest. Of course, *ceteris paribus*, when a player is more involved in the contest, he has a higher probability of winning. In many cases it is in the public interest or in the interest of the ruling politicians to induce one of the participants in the contest to be more active, that is, be more involved in the contest. Typically, the provision of such an incentive is considered in the context of contests that arise when the government proposes some new public policy, e.g., some new form or degree of monopoly regulation, (Ellingsen, 1991), a tax reform or a trade policy, and the contest outcome determines whether the proposed policy is approved or rejected (Epstein and Nitzan, 2002a, 2006b).

a The Variable Contest

The total amount of prizes in the contest is denoted by V . With probability $\text{Pr}_i (i = 1, 2)$ player i wins the contest and gains $\alpha_i V$, where $0 < \alpha_i < 1$ and $\alpha_1 + \alpha_2 = 1$. He loses the contest and gains no prize and gains no prize with probability $\text{Pr}_j = 1 - \text{Pr}_i$. The expected net payoff of i is given by:

$$E(w_i) = \text{Pr}_i \alpha_i V - x_i \quad \forall i = 1, 2. \quad (\text{C.11})$$

Our primary concern is with question how do changes in the value of the total prize V and in its distribution affects the effort exerted by the players. To analyze this problem, we consider an exogenous variable I that affects both the value of the total prize V and the share each of the players may gain, α_i . Both α_i and V thus depend on the value of the parameter I : $\alpha_i(I)$ and $V(I)$.

By our assumptions, both players participate in the contest (x_1 and x_2 are positive). We therefore focus on interior Nash equilibria of the contest. Solving the first-order conditions $\left(\frac{\partial E(w_i)}{\partial x_i} = 0 \quad \forall i = 1, 2 \right)$ we obtain:

$$\Delta_i = \frac{\partial \text{Pr}_i(x_i, x_j)}{\partial x_i} \alpha_i(I) V(I) - 1 = 0 \quad \forall i \neq j \quad \text{and} \quad i, j = 1, 2. \quad (\text{C.12})$$

The first-order conditions therefore require⁷⁴ that:

$$\frac{\partial \text{Pr}_i}{\partial x_i} = \frac{1}{\alpha_i(I) V(I)} \quad \forall i = 1, 2. \quad (\text{C.13})$$

By the expressions in Eq. (C.13) that determine the equilibrium efforts of the players and their probabilities of winning the contest and by the assumed properties of the CSF, we directly obtain that under a symmetric contest success function⁷⁵ ($\forall x_i, x_j, \text{Pr}_i(x_i, x_j) = \text{Pr}_j(x_j, x_i)$), the player with the higher stake makes a larger effort and has a higher probability of winning the contest. The probability of the socially more efficient outcome of the contest is therefore higher than the probability of the less efficient outcome. For a similar result see Baik (1994) and Nti (1999). This type of efficiency criterion has been used by Ellingsen (1991), Fabella (1995) and, more recently, by Hurley and Shogren (1998).

Let us now consider the effect of changes in I on the effort exerted by the players. These efforts deserve attention because they can be interpreted as social costs and because they represent each player's involvement in the contest that often becomes a direct target of the agent (usually the government) that controls I , the contest designer. In other words, when a player is more involved in the contest, his probability of winning the contest becomes higher, which might coincide with the interest of the contest designer. The selection of

⁷⁴ It can be easily verified that the second-order conditions hold.

⁷⁵ Such symmetry implies that the two players share an equal ability to convert effort into probability of winning the contest.

the functions $\alpha_i(I)$ and $V(I)$, or the selection of I when these functions are given might therefore be of considerable significance to the contest designer. In many cases it is indeed in the public interest or in the interest of the ruling politicians to induce one of the contestants to be more involved in the public debate over issues such as monopoly regulation, some environmental policy, a tax reform or a new trade policy. Typically, the provision of such an incentive is considered in the context of contests on the approval or rejection of new policy proposals by the government.

A change in I affects both the total amount of prizes in the contest V and the share each of the players gains if he wins the contest. Notice that there are four different types of variability patterns corresponding to the four possible sign combinations of $\frac{\partial V}{\partial I}$ and $\frac{\partial \alpha_i}{\partial I}$: a change in I that reduces (increases) the prize to be divided between the players, that is, $\frac{\partial V}{\partial I} > 0$ ($\frac{\partial V}{\partial I} < 0$) and redistributes benefits in favor of player i (player j), which implies an increase (a decrease) in the share of the prize that goes to player i , that is, $\frac{\partial \alpha_i}{\partial I} > 0$ ($\frac{\partial \alpha_i}{\partial I} < 0$).

The effort of a contestant is determined not only by the effect of I on V and α_i , but also by the ability of contestant j to convert effort into probability of winning the contest. This ability can be represented by the marginal effect of a change in his effort on his winning probability. By assumption, this marginal effect is declining with his own effort. A change in his effort also affects, however, the marginal winning probability of his opponent i . The opponent i has an advantage in terms of ability if a change in j 's effort positively affects his marginal winning probability. In other words, a positive (negative) sign of the cross second-order partial derivative of $\text{Pr}_i(x_i, x_j)$, $\frac{\partial^2 \text{Pr}_i}{\partial x_j \partial x_i}$, implies that i has an advantage (disadvantage) when j 's effort changes. At some given combination of efforts (x_i, x_j) , the ratio between the effect of a change in j 's effort on the marginal winning probability of i and the effect of a change in j 's effort on his own ability, $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} / \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \right)$, is therefore a local measure of the asymmetry between the abilities of i and j .

As shown in Eq. (C.4), we get that the Nash equilibrium efforts satisfy:

$$\frac{\partial x_i^*}{\partial I} = \frac{\frac{\partial \Delta_i}{\partial x_j} \frac{\partial \Delta_j}{\partial I} - \frac{\partial \Delta_j}{\partial x_j} \frac{\partial \Delta_i}{\partial I}}{\frac{\partial \Delta_i}{\partial x_i} \frac{\partial \Delta_j}{\partial x_j} - \frac{\partial \Delta_j}{\partial x_i} \frac{\partial \Delta_i}{\partial x_j}}, \quad i \neq j, \quad i, j = L, H. \quad (\text{C.4})$$

Rewriting Eq. (C.4) together with Eq. (C.13), we obtain:

$$\begin{aligned} \frac{\partial x_i^*}{\partial I} &= D \left\{ \frac{V'}{V} \left(\frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} - \frac{\alpha_j}{\alpha_i} \right) + \frac{\alpha'_j}{\alpha_j} \left(\frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} + \left(\frac{\alpha_j}{\alpha_i} \right)^2 \right) \right\} \\ &= D \left\{ \frac{V'}{V} \left(\frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} - \frac{\alpha_j}{\alpha_i} \right) - \frac{\alpha'_i}{\alpha_i} \frac{\alpha_i}{(1 - \alpha_i)} \left(\frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} + \left(\frac{\alpha_j}{\alpha_i} \right)^2 \right) \right\} \\ \forall i \neq j, i, j &= 1, 2, \end{aligned} \quad (\text{C.14})$$

where

$$V' = \left(\frac{\partial V}{\partial I} \right), \quad \alpha'_i = \left(\frac{\partial \alpha_i}{\partial I} \right)$$

and $D = \left(V \alpha_j \frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right)^{-1} \right) < 0$.

In this equation one can clearly distinguish between the separate effects on i 's effort of a change in the relative size of the prize and of a change in the relative share of i 's stake. The change in the relative size of the prize is given by V'/V (see the first component in the RHS of the equation). There may be many measures for the change in the share of i 's stake. We consider the measure that takes into account both the relative (percentage) change in i 's share of the stake, $\frac{\alpha'_i}{\alpha_i}$, and the distribution of the stakes, $\frac{\alpha_i}{\alpha_j} = \frac{\alpha_i}{(1-\alpha_i)}$. The former element by itself is inadequate, because it doesn't provide all relevant information. For example, $\frac{\alpha'_i}{\alpha_i}$ may equal 10%, however, it is not clear 10% of what? We thus factor this element by $\frac{\alpha_i}{1-\alpha_i}$, which means that the measure we use is $\frac{\alpha'_i}{\alpha_i} \frac{\alpha_i}{(1-\alpha_i)}$ (see the second component in the RHS of the equation). It is clear that the weight of the effect of the change in the relative size of the prize is *smaller* than the weight of the effect of the change in the relative share of j 's stake:

$$\frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} - \frac{\alpha_j}{\alpha_i} < \frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} + \left(\frac{\alpha_j}{\alpha_i} \right)^2.$$

However,

$$\left| \frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} - \frac{\alpha_j}{\alpha_i} \right| > \left| \frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} + \left(\frac{\alpha_j}{\alpha_i} \right)^2 \right| \quad \text{only if} \quad \frac{\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j}}{\frac{\partial^2 \text{Pr}_j}{\partial x_j^2}} - \frac{\alpha_j}{\alpha_i} < 0.$$

Hence,

Proposition C6: *Moreover, if the effect of a change in the sum of the prize is stronger than the effect of the change in the prize distribution, then the net effect of the change is negative.*

The effect on i 's effort of a change in the prize distribution is always larger than the effect on i 's effort of a change in the sum of the prizes.

This Proposition states that when there is a change in both the size of the prizes and in their distribution, the direct incentives corresponding to the change in the contestant's relative share are larger than the indirect incentives corresponding to the change in the contest prize. On the other hand, if the

effect of the relative share is weaker than the indirect incentives corresponding to the change in the contest prize, then the effect of the change in the size is negative. In particular, if both weights are positive, then in the case of a contest for part of the GNP, the waste (lobbying efforts) are affected more through the contestants' direct distributional (relative inequality) incentives than through the indirect size (the size of the contested "cake") incentives.

To illustrate the implications of the Proposition, consider the case where player i is the weak player, both in terms of the share he gains in the case of winning the contest and in terms of the equilibrium probability of winning, that is, $\alpha_j > \alpha_i$ and $\frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} < 0$. Now suppose that the relative change in player j 's share equals the relative change in the size of the prizes: $\frac{\alpha'_j}{\alpha_j} = \frac{V'}{V}$ or putting it differently $\frac{\alpha'_i}{\alpha_i} \frac{\alpha_i}{\alpha_j} = \frac{V'}{V}$ and that both j 's share and the sum of the prizes are reduced, that is, $\alpha'_j < 0$ ($\alpha'_j > 0$) and $V' < 0$. In such a case player j reduces his effort. By applying (C.10), we obtain that $\frac{\partial x_i^*}{\partial I} > 0$ and $\frac{\partial x_j^*}{\partial I} < 0$. That is, although player i receives a higher share of the reduced aggregate prize in the case of winning the contest, he increases his effort. The increased involvement of player i and the reduced involvement of player j increases i 's chances of winning the contest.

To conclude, we have shown that in a general two-player contest, a change in the relative share of the aggregate prize has a larger effect on the effort invested by a contestant in comparison to a change in the relative size of the aggregate prize. A contestant's behavior is always more sensitive to a change in intensity of competition as measured by $\frac{\alpha'_i}{\alpha_i} \frac{\alpha_i}{(1-\alpha_i)}$ relative to a change in the intensity of competition as measured by V'/V .

We have shown that government intervention often gives rise to contests in which the possible prizes are determined by the existing status-quo and some new public-policy proposal. Focusing on a general class of two-player public-policy contests, we have examined the effect of a change in the proposed policy on the rent dissipation of the contestants. Our main result clarifies what are the asymmetry conditions under which a more restrained government intervention that reduces the contestants' prizes has the perverse effect of increasing their aggregate lobbying efforts. This result complements the findings of Baye et al. (1993), that were established in the context of all-pay auctions, and the findings of Che and Gale (1997), (1998), that were based on the assumption that rent seekers are budget constrained. While these workers focused, respectively, on constraints on the set of contestants and on caps on lobbying expenditures as possible means of reducing the asymmetry between the contestants, we emphasize the role of public-policy reforms in generating direct changes in stakes-asymmetry and indirect changes in ability-asymmetry between the contestants. In the context of an all-pay lobbying auction, a politician wishing to maximize political rent-seeking expenditures may find it in his best interest to exclude certain lobbyists who highly value the political prize from participating in the lobbying contest, Baye et al. (1993). He may

also find it in his best interest to impose budget constraints on the rent seekers, Che and Gale (1998) or, in the presence of such constraints, to operate in a political economic environment that has a lower tolerance for rent seeking (influence activities are awarded less in such an environment), Che and Gale (1997). Our study clarifies that in a public-policy contest that allows a large family of CSFs, a politician may find it in his best interest to reduce government intervention that takes the form of reducing the stakes of the interest groups that correspond to the proposed public policy.

IX

Asymmetry and Corrective Public Policy

In the context of inefficiency due to government intervention, resource misallocation can be aggravated if wasteful resources (lobbying, rent-seeking or rent-avoidance efforts) are spent by interest groups that attempt to influence the outcome of the political decision-making process in their favor. The outcome of this process is usually uncertain. When some inefficient public policy is proposed, for example, because of some effective political constraints, typically some interest groups are interested in its approval and implementation, whereas other groups resist it preferring the status quo. The main objective of this chapter is to specify the conditions that ensure the existence of an effective corrective tax-transfer policy that complements an existing inefficient public-policy proposal. Effectiveness of the corrective policy means, first, that it secures an efficient contest outcome. Secondly, that given the existing inefficient policy proposal, it is optimal from the viewpoint of both interest groups.

In the rent-seeking literature it has been established that asymmetry between the contestants reduces the wasteful lobbying efforts. The asymmetry can be in terms of the lobbying capabilities, wealth endowments, attitudes toward risk or rent valuations of the contestants, see, for example, Allard (1988), Gradstein (1994) and Nitzan (1994). In the current chapter we show that sufficient asymmetry between the interest groups is also a necessary condition for the existence of an effective corrective tax-transfer policy.

1 The Extended Contest

In the standard rent-seeking model that we study, the policy proposal consists of two elements. The first element is some particular public policy that may describe the existing implemented government policy. For example, in the context of monopoly regulation, this public policy can be the profit-maximizing monopoly price. In the context of local industry regulation, this policy can

be some particular protective tariff that is appealing to some politically effective interest group. In the context of quality or quantity regulation of some local public good, it can be a particular quality or quantity of that good. Typically, the implementation of this policy results in some positive benefit for one interest group and in some negative benefit for another interest group. The second element of the proposal is the means to (partly) correct the inefficiency associated with the implemented policy. This corrective-policy instrument is a transfer from one interest group to the other and it can be conceived as a tax paid by the player winning the contest. The tax can be levied on the interest group that prefers that the proposed policy is approved or on the group that prefers that it is rejected.

These players are the monopoly and the customers coalition in the context of monopoly regulation, the local producer and consumers in the context of import regulation, and the benefactors and losers from the provision of a particular local public good. In the latter case, suppose that the local public good is a national park located at the border of a residential neighborhood. The local residents, the individuals who live close to the park oppose the proposal to build the park because of the negative externalities associated with living close to a public park that attracts a large number of visitors all year round. The rest of the population prefers that the park is built. In terms of the corrective tax-transfer policy, one possibility is that if the park is built, a tax is levied on the general public and transferred to the local residents to compensate them for their welfare loss resulting from the existence of the park. The alternative possibility is that a tax be levied on the local residents in the event that the park is not built. In such a case the tax is transferred, as a compensation, to the frustrated citizens whose preferred policy is rejected. The representatives of these interest groups are the two players who engage in the contest on the approval of the proposed policy.

Let T denote the proposed corrective tax transfer. The tax is to be paid by player j in the event that the decision made by the incumbent politician is in his favor. This event can be the approval or the rejection of the proposed policy, dependent on player j 's preferences. The tax collected from player j is transferred to the other player, i , as a compensation for his welfare loss.

The expected net payoffs as presented by Eq. (A.2) of the contestants are given respectively by⁷⁶:

$$E(w_j) = A_j + \Pr_j(n_j - T) - x_j, \quad (\text{C.15})$$

and

$$E(w_i) = A_i - \Pr_j(n_i - T) - x_i, \quad (\text{C.16})$$

⁷⁶ We assume that player i knows that if player j wins the contest he will receive the transfer T . Assuming that player i does not consider the tax as a transfer or, alternatively that he views only part of the tax as a transfer would not change the general results.

where A_j is player j 's payoff when his preferred policy is not approved and n_j is the benefit (stake) of player j from winning the contest when no corrective tax transfer is applied. A_i is player i 's payoff when his preferred policy is approved and $\text{Pr}_j(n_i - T)$ is the expected magnitude of the net loss when i loses (j wins). Thus, n_i is the magnitude of the loss to i when j wins when no corrective tax transfer is applied. We assume that $n_i \geq T$, since otherwise one of the players does not participate in the contest. In other words, this assumption is a necessary condition for the existence of an interior contest equilibrium (x_j and x_i are positive).

The probabilities Pr_j and Pr_i are obtained by the Tullock's (1980) commonly used rule contest success function. From Eqs. (A.8) and (A.9) we obtain the equilibrium rent-seeking rent-avoidance expenditures and their winning probabilities are given by:⁷⁷

$$x_i^* = \frac{(n_i - T)^2 (n_j - T)}{(n_i + n_j - 2T)^2}; \quad x_j^* = \frac{(n_i - T)(n_j - T)^2}{(n_i + n_j - 2T)^2}, \quad (\text{C.17})$$

and

$$\text{Pr}_i^* = \frac{(n_i - T)}{(n_i + n_j - 2T)}; \quad \text{Pr}_j^* = \frac{(n_j - T)}{(n_i + n_j - 2T)}.$$

From Eq. (C.17), we directly obtain that the player with the higher net payoff (stake) invests more resources in the contest and has a higher probability of winning the contest. In equilibrium, the players' relative probabilities of winning the contest are equal to their relative rent-seeking rent-avoidance expenditures and to their relative stakes.

From Eq. (A.10) the total rent-seeking rent-avoidance outlays of the players equals

$$X^* = x_i^* + x_j^* = \frac{(n_i - T)(n_j - T)}{n_i + n_j - 2T}. \quad (\text{C.18})$$

Taking the derivative of player i 's odds of winning the contest with respect to the proposed tax, T , and the derivative of the total rent-seeking rent-avoidance expenditures of the contestants with respect to T , we get

$$\frac{\partial (\text{Pr}_i^* / \text{Pr}_j^*)}{\partial T} = \frac{\partial (x_i^* / x_j^*)}{\partial T} = \frac{n_i - n_j}{(n_j - T)^2}, \quad (\text{C.19})$$

and

$$\frac{\partial X^*}{\partial T} = -\frac{(n_i - T)^2 + (n_j - T)^2}{(n_i + n_j - 2T)^2}. \quad (\text{C.20})$$

We thus directly obtain that a change in the proposed tax transfer, T , positively affects the higher-stake player's odds of winning the contest and his relative investment in the contest. Such a change negatively affects the total expenditures of the contestants.

⁷⁷ We assume that for $T = \text{Min} \{n_j, n_i\}$, $x_j^* = x_i^* = 0$ and that the winning probability of the higher-stake player is equal to one.

2 An Effective Corrective Tax-transfer Policy

The public interest is represented by the expected aggregate payoff

$$E(U^*) = E(w_i^*) + E(w_j^*) . \quad (\text{C.21})$$

To examine the effect of the corrective tax transfer scheme on social welfare, let us substitute Eq. (C.17) into Eq. (C.21) to obtain the equilibrium expected aggregate welfare $E(U^*)$ corresponding to the possible levels of the tax T and, in turn, to the induced equilibrium rent-seeking rent-avoidance outlays.⁷⁸

$$E(U^*) = A_j + A_i + \frac{n_j - T}{n_j + n_i - 2T} (n_j - 2n_i + T) . \quad (\text{C.22})$$

Since expected social welfare increases with the proposed tax T , the optimal tax is the highest possible, that is, $T^* = \text{Min}\{n_j, n_i\}$. Under this corrective policy the player with the higher benefit wins the contest, as the other player becomes inactive. The optimal tax eliminates the potential inefficiency associated with the approval of the first-element distorting public policy. It also eliminates the potential inefficiency implied by positive wasteful rent-seeking rent-avoidance expenditures. If, given the existing inefficient public-policy proposal, the corrective policy is also an optimal policy from the viewpoint of the two interest groups, we refer to it as an effective corrective policy. This property increases the legitimacy of the proposed corrective policy ensuring that there is no conflict between the interest groups regarding the form of the corrective policy that should complement the existing policy proposal.

Our main result specifies the necessary and sufficient conditions for the existence of such an effective corrective policy.

By Eqs. (C.15) and (C.17), in equilibrium the expected net payoffs of the players are given by:

$$E(w_j^*) = A_j + \frac{(n_j - T)^3}{(n_j + n_i - 2T)^2} , \quad (\text{C.23})$$

and

$$E(w_i^*) = A_i + \frac{(n_i - T)^3}{(n_j + n_i - 2T)^2} - (n_i - T) . \quad (\text{C.24})$$

The second-order derivatives of these expected net payoffs with respect to the proposed corrective tax transfer T are positive. Hence, to identify the optimal tax transfer from the viewpoint of player i and player j , we must compare the values of the expected net payoffs at $T = 0$ and at the maximum possible value of T , $T = \text{Min}\{n_i, n_j\}$. Clearly, player i 's expected net payoff is higher with the highest possible tax than with a zero tax since such a tax transferred to him is equivalent to his winning the contest. It therefore secures him the

⁷⁸ Administrative costs of collecting and transferring the tax are disregarded.

maximal possible benefit n_i . The comparison between player j 's expected net payoffs in the two extreme tax levels hinges on the relationship between n_i and n_j . Notice, first, that

$$E(w_j^* | T = 0) = A_j + \frac{(n_j)^3}{(n_j + n_i)^2}. \quad (\text{C.25})$$

If $n_i > n_j$, the highest possible tax is n_j , in which case

$$E(w_j^* | T = n_j) = A_j. \quad (\text{C.26})$$

Clearly, the value of the expression in Eq. (C.25) is greater than the value of the expression in Eq. (C.26). We thus obtain that in this case the optimal tax for player j , $T = 0$ differs from the optimal tax for player i , $T = n_j$.

If $n_i < n_j$, the highest possible tax is n_i , in which case

$$E(w_j^* | T = n_i) = A_j + (n_j - n_i). \quad (\text{C.27})$$

The value of the expression in Eq. (C.27) is greater than that in Eq. (C.25) if

$$\frac{n_j - n_i}{n_i} > \frac{n_i}{n_j}. \quad (\text{C.28})$$

In this case the same extreme tax, $T = n_i$, is optimal for player i and for player j .

If the stake of player j is sufficiently high (it exceeds player i 's stake by at least 60%), then he prefers to fully subsidize player i to ensure that he stays out and does not compete against him on the approval of the combined public-policy proposal, thus ensuring his certain contest winning. In such a case even the slightest chance of losing decreases his expected net payoff and he prefers to pay off the other player not to compete. This latter option is also optimal for player i . To sum up,

Proposition C7: *If $\frac{n_j - n_i}{n_i} > \frac{n_i}{n_j}$, then $T = n_i$ is effective, that is, $(x_i, x_j) = (0, 0)$ is an equilibrium outcome in the extended contest and $T = n_i$ maximizes the expected net payoff of every interest group.*

This Proposition specifies the conditions that ensure the existence of a unanimously supported, perfectly corrective, equilibrium tax transfer. The necessary conditions for the existence of such an effective corrective policy is, first, that the tax is levied on the winning player with the higher stake and, second, that his stake is sufficiently large. The perfectly corrective tax transfer $T = n_i$ is optimal from the viewpoint of the lower-stake player, since it secures him the maximal possible benefit, n_i . However, the perfectly corrective tax transfer is not necessarily optimal from the viewpoint of the higher-stake player. Since this player's objective function is convex in T , his optimal tax

transfer is equal to zero or to his opponent's stake, n_i . A necessary condition for the superiority of $T = n_i$ over $T = 0$ is that his certain benefit in the former case, $(n_j - n_i)$, is higher than his expected benefit in the latter case. A sufficiently large difference between the players' stakes guarantees that the perfectly corrective tax transfer is also optimal from the higher-stake player's viewpoint. By the Proposition, such optimality is ensured if n_j exceeds n_i by at least 60%.

A different way of looking at this is as follows. Interest group i expends x_i on rent seeking and interest group j expends x_j on rent avoidance. If the sum of outlays in the contest equilibrium is smaller than the "surplus", $n_j - n_i$, then j would be willing to buy the right to win at a price of $n_i + x_i$. This would leave j with a positive profit of $n_j - (n_i + x_i^*) - x_j = (n_j - n_i) - (x_i^* + x_j^*)$. Interest group j would therefore be induced to buy out interest group i if $(n_j - n_i) - (x_i^* + x_j^*) > 0$. *Using Eq. (C.18) with $T = 0$ we obtain that $(n_j - n_i) - (x_i^* + x_j^*) > 0$ if $\frac{n_j - n_i}{n_i} > \frac{n_i}{n_j}$ (the condition in the Proposition).* In other words, the contestants skip the contest in favor of a deal that gives j the right of rejecting the inefficient policy proposed for a compensatory payment of n_i to i . This Coase solution is implemented by the tax $T = n_i$.

To further relate our result to Coase theorem (1960), let us view the politician as an agent who assigns "the right to decide the policy issue" to i or to j by holding a contest. As a rent seeker, i expends x_i to obtain the right of deciding in favor of the proposed policy. As a rent avoider, j spends x_j to secure the right of deciding against the proposed policy. The right is assigned through a lottery determined by the expenditures. The sum of these equilibrium expenditures can be viewed as the transaction costs generated by the uncertainty characterizing our environment. Given the well-defined property rights of the two parties and our assumption of perfect information, if these transaction costs are smaller than the contestants' realizable surplus, $(n_j - n_i)$, then the two parties can reach a mutually advantageous bargain that overcomes the potential inefficiency. This is the variant or modification of Coase theorem that is valid in our uncertain political economic environment.

Note that this is also related to the literature on optimal voting schemes (see, for example, Barzel and Sass, 1990). Optimal voting theory explains under what conditions voting will be chosen as a means for allocating resources and how the constitution that governs the voting will be structured. Barzel and Sass (1990) show that developers of voting organizations will structure their organizations in order to maximize the value of shares sold by minimizing the expected costs of wealth transfer and decision making in the voting organization.

Two conditions ensure the elimination of the two possible types of potential inefficiency. First, the rejection of the proposed policy that results in inefficiency and, second, the inducement of the participants in the contest on the approval of the proposed corrective policy to avoid active participa-

tion, i.e. avoid any wasteful rent-seeking rent-avoidance outlays. These two efficiency conditions are satisfied by a perfectly corrective tax transfer that induces the lower-stake player not to take part in the contest. In such a case no rent-seeking rent-avoidance outlays are expended and the proposed inefficient public policy is rejected, i.e. the higher-stake player is the certain winner. The perfectly corrective tax must be levied on the winning, higher-stake, player and be equal to the lower stake (the benefit forgone by the lower-stake player).

In our political economic setting the resolution of the inefficiency problem depends on the existence of a sufficiently large gap between the payoffs of the two agents: the agent with the higher contest stake and the compensated agent with the lower contest stake. Such asymmetry amounts to the requirement that the transaction costs in our uncertain setting, the sum of the rent-seeking rent-avoidance expenditures, do not exceed the realizable surplus (the difference between the contestants' stakes). Payoff asymmetry induces, as is already known, lower lobbying efforts in standard contests with a Tullock-type contest success function. Our result clarifies that minimal payoff asymmetry is a necessary prerequisite for an effective remedy of the potential inefficiencies associated with government intervention and with the political contest over the approval of its proposed policies. Note that effectiveness in our case implies that the proposed corrective tax-transfer scheme not only ensures efficiency. It also secures unanimous support of the corrective policy by the interest groups affected by the proposed public policy.

Our model is based on a number of common simplifying assumptions.⁷⁹ However, an important advantage of our proposed approach is its broad applicability. In fact, any setting where public policy affects the payoffs of two agents (interest groups), such that one agent is interested in the approval of the proposed policy and the other agent supports the rejection of that proposal can serve as an illustration to our model. For example, one can easily apply our model by assuming that the first-element policy instrument is the price of a regulated monopoly (Epstein and Nitzan, 2003b, see also Part E) or the determination of minimum wage (Epstein and Nitzan, 1999, see also Part E). In such a case the interest groups affected by the intervention of the government are the producer (the potential monopoly) and the consumers.

⁷⁹ First, we assume that public policy affects just two interest groups. Second, we disregard the possibility that public policy is a public good affecting groups of individuals. Consequently, we do not study contests among groups on private or public-good rents, as in Baik (1994), Gradstein (1993), Nitzan (1991, 1994) or Riaz, Shogren and Johnson (1995). Third, our analysis is based on the assumption that the contest success function (CSF) is the commonly assumed special case of Tullock's (1980) CSFs. Alternative, more general CSF's can be assumed. For example, Tullock's general CSF, as in Baye, Kovenock and de Vries (1993), Che and Gale (1998) or the more general logit form, as in Baik and Shogren (1992), Dixit (1987), Gradstein (1994), Rosen (1986) or Snyder (1989).

Alternatively, the first-element policy can be the quality of some local public good or the degree of privatization of a particular publicly owned company. In these cases the natural contestants on the approval or rejection of the proposed public policy are the different groups consuming and/or financing the public good in the first case or the employees of the privatized company and its potential purchasers in the second case.

The Extended Contest: Without Government

This part introduces our second model of endogenous public policy, where the government does not determine the proposed public policy. Rather the two competing policies are determined by the interest groups. We first present a simple version of the extended contest where the policy is determined endogenously by one of the contestants. To clarify the relationship between this model and the existing literature and to illustrate its significance, we present the model applying a monopoly-consumer context. We then deal with the general extended contest where the two policy proposals are determined by the two contestants.

The Social Cost of Rent Seeking when Consumer Opposition Influences Monopoly Behavior

In this chapter we present a simple version of the extended contest where the policy is determined endogenously, not by the government, but rather by one of the contestants. To clarify the relationship between this model and the existing literature and to illustrate its significance, we present the model applying a monopoly–consumer context.

Models of the effect of consumer opposition on monopoly rents (including Baik 1999, Ellingsen 1991, Schmidt 1992, Fabella 1995, and Keem 2001) share the assumption that the monopolist sets the profit-maximizing price. When the monopolist can commit to a price, this is, however, not the rational price setting response of a monopolist confronting consumer opposition. Rather, consumer opposition to monopoly rents leads a potential monopolist to choose a price lower than the profit-maximizing monopoly price.⁸⁰ The stakes of the firm and the consumers therefore differ from the models in the literature. The monopoly rent is in particular endogenous, since the rent depends on the monopoly price proposed by the rent seeker. A lower proposed monopoly price lowers the rent and reduces consumer opposition. The firm therefore trades off a lower rent if successful in becoming a monopoly against a higher probability of winning because of the reduced consumer opposition.

We assume that, if the firm wins the contest against the consumer lobby, the regulator enforces the lower price. A commitment by the firm to charge the lower price (if the firm is successful in seeking monopoly power) is credible to the consumer lobby, which therefore lobbies less than if the profit-maximizing price were the anticipated price that the successful monopolist would set. The presence of a consumer lobby is therefore beneficial in lowering deadweight losses in the event that the firm is granted monopoly status. Resources expended in rent seeking also change.

⁸⁰ See also Cheung and Wang (1996), who study the consequences of discriminatory pricing by a monopolist in a rent-seeking economy. They show that the monopolist has an incentive to charge a lower price to high-opposition consumer groups so as to alleviate opposition to monopoly power.

Our model has some parallels with limit pricing in the industrial organization literature. A limit price is sustained over time by the ongoing threat of competitive entry.⁸¹ Also, Leidy (1994) has shown that a monopoly may decide, in one period, to engage in self-regulation, in order to sustain monopoly power in the next period. Our view of monopoly price sustained by a regulator is consistent with Peltzman's model (1976) of political-support maximizing regulation, where the regulator trades off the interests of producers and consumers.

We show that the conditions derived in the literature are only sufficient for consumer defensive activities to reduce the social cost of monopoly, and that only under special cases are the same conditions also necessary. The reduced price chosen by the monopoly also constitutes a Pareto improvement relative to the models that describe a successful monopolist as setting the profit-maximizing price.

1 The Monopoly–Consumer Contest

We consider as a benchmark a one-stage contest with one firm competing for the monopoly status. Following Ellingsen (1991) and Baik (1999), we assume that the producer's valuation (stake) of winning the contest is the monopoly profit T and that the deadweight loss associated with the monopoly price P_m is H (see Fig. D.1). The potential monopoly faces the opposition of a consumer organization that seeks to maintain a competitive price P_r . If this organization wins the contest against the firm, its payoff is equal to the gain in the consumers' surplus, $H + T$. In this stylized rent-seeking rent-avoidance contest free-riding incentives among the consumers and the producers are disregarded. In fact, only one consumer, c , is assumed to oppose the single producer (potential monopoly), f . In such a case, the stake of the consumer is higher than that of the firm. We denote the stakes of player j by n_j . Hence, $n_c = H + T$ and $n_f = T$.

Here we concentrate on the expected net payoff as presented in Eq. (A.3):

$$E(w_c) = \text{Pr}_c n_c - x_c, \quad (\text{D.1})$$

and

$$E(w_f) = (1 - \text{Pr}_c) n_f - x_f, \quad (\text{D.2})$$

where Pr_c and Pr_f are the winning probabilities of the two contestants.

As in Ellingsen (1991) and Baik (1999), we assume that the contest is determined by Tullock's (1980) nondiscriminating rule.

It is clear from the structure of the game that both players participate in the contest (x_c and x_f are positive) and that one of them wins the contest. We therefore focus on interior Nash equilibria of the contest. The conditions characterizing an interior equilibrium of our two-player contest (subgame) are given by Eq. (A.6).

⁸¹ See Tirole (1988).

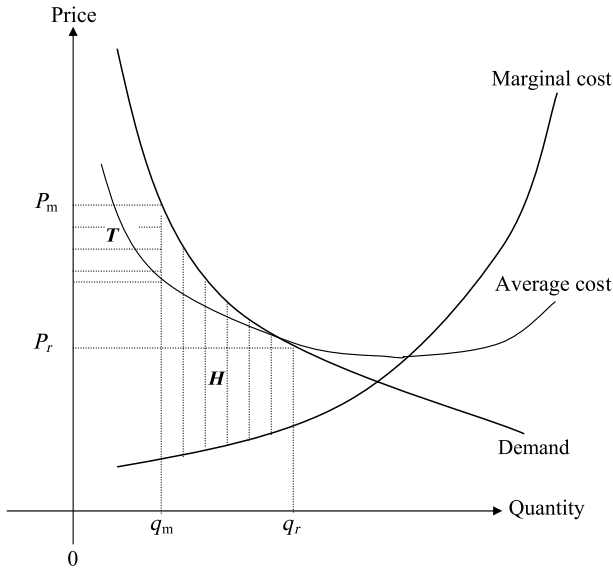


Fig. D.1.

2 The Welfare Effect of Consumer Participation

The expected social cost (welfare loss) in equilibrium, $E(SC)$, is defined as the sum of the expected deadweight loss and the total outlays of the contestants,

$$E(SC) = (1 - \text{Pr}_c^*)(n_c - n_f) + x_c^* + x_f^* = \frac{n_f(2n_c - n_f)}{n_c + n_f}. \quad (\text{D.3})$$

Ellingsen (1991), Schmidt (1992) and Baik (1999) are concerned with the effect of consumers' rent-avoidance efforts on the social cost of monopoly. They therefore compare $E(SC)$ with $n_c - n_f = H$, the monopoly cost when there is no consumer opposition to the existence of monopoly rents. The necessary and sufficient condition for consumer opposition to be welfare enhancing ($E(SC) < n_c - n_f$) is directly obtained from Eq. (D.3):

Lemma D1: *Consumers' participation reduces the social cost of monopoly if and only if $n_c - n_f > n_f$ ($H > T$).*

This result appears in Ellingsen (1991), Proposition 2, in Schmidt (1992) and in Baik (1999).

3 The Contestable Monopoly Price – Two-stage Game

To simplify the presentation of our main point, we assume that in the first stage of the game only the producer decides which price to lobby for and

then in the second stage both interest groups engage in the contest over the approval of the proposed policy.^{82,83}

The stakes of the producer and the consumers are equal, respectively, to n_f and n_c . These stakes depend, in general, on the price that the producer is allowed to charge if he wins the contest (secures monopoly status). In the particular case analyzed above, the stakes are determined by the profit-maximizing monopoly price P_m . The producer is, however, aware of the dependence between the monopoly price and the contestants' status. He would therefore try to secure a price that is optimal from his point of view. Put differently, as an informed rational player who makes decisions under uncertainty, he would be interested in a monopoly price that maximizes his expected net payoff. This price is always lower than the profit-maximizing monopoly price P_m .

To prove this claim, we denote by P the contestable monopoly price. The stakes of the consumers and the producer are a function of the price P : $n_c(P)$ and $n_f(P)$. From Eq. (A.11) the producer's expected net payoff is given by:

$$E(w_f^*) = \frac{(n_f(P))^3}{(n_c(P) + n_f(P))^2}. \quad (\text{D.4})$$

The positive price $P = P^*$ that maximizes $E(w_f^*)$ is characterized by the following first-order condition:

$$\begin{aligned} \frac{\partial E(w_f^*)}{\partial P} &= \frac{3(n_f(P))^2 (n_c(P) + n_f(P))^2 \frac{\partial n_f(P)}{\partial P}}{(n_c(P) + n_f(P))^4} \\ &\quad - \frac{2(n_f(P))^3 (n_c(P) + n_f(P)) \left(\frac{\partial n_f(P)}{\partial P} + \frac{\partial n_c(P)}{\partial P} \right)}{(n_c(P) + n_f(P))^4} = 0. \end{aligned} \quad (\text{D.5})$$

At the profit-maximizing monopoly price, P_m , $\frac{\partial n_f(P)}{\partial P} = 0$. Since $\frac{\partial n_c(P)}{\partial P} > 0$, at P_m , $\frac{\partial E(w_f^*)}{\partial P} \Big|_{P=P_m} < 0$. This implies that the price that maximizes the producer's expected net payoff is smaller than the profit-maximizing monopoly price. Therefore,

Lemma D2: $P^* < P_m$.

This result is similar to that of Leidy (1994). Lemma D2 implies that the social cost of monopoly without consumer defending activities is $n_c(P_m) - n_f(P_m) = H$. However, when consumers defend their surplus, the contestants' stakes are smaller than previously assumed in the literature, because of the lower price. Let $T' = n_f(P^*)$ and $T' + H' = n_c(P^*)$ denote the producer and

⁸² We assume that the price commitment is feasible and is fully implemented after the contest by the regulator.

⁸³ Generalizing the model to a two-stage game with n firms does not alter the basic message of the chapter.

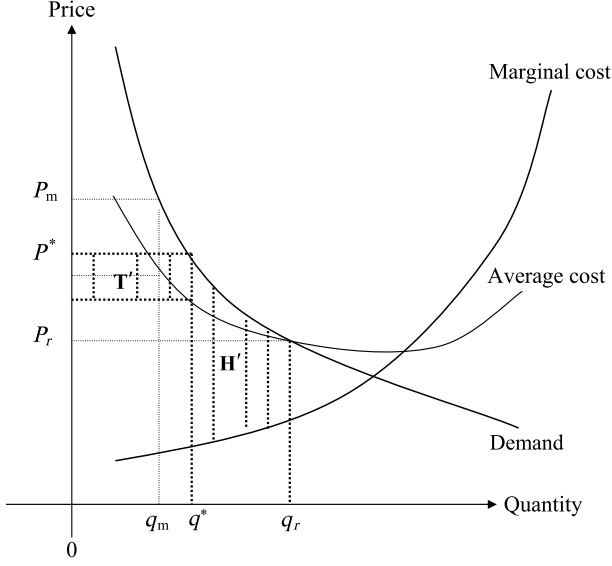


Fig. D.2.

the consumers' stakes under P^* (see Fig. D.2). The intuition of this result is as follows: lowering the price slightly below the profit-maximizing monopoly price leads only to a second-order decrease of the firm's stake (its profit from winning the regulatory contest), but yields a first order increase in consumers surplus. Since this decreases the customer stake, consumers will be less aggressive in the contest and, in turn, their probability of winning the contest is reduced. This favorable effect dominates the former unfavorable effect and therefore the firm prefers to lobby for a price P^* that is lower than P_m .

4 The True Social Cost of Monopoly

We now recalculate the true social cost of the monopoly (hereafter TSC) given the price P^* . From Eq. (D.3),

$$E(TSC) = \frac{n_f(P^*)(2n_c(P^*) - n_f(P^*))}{n_c(P^*) + n_f(P^*)} = \frac{2T'H' + T'^2}{2T' + H'} \quad (D.6)$$

The welfare effect of consumers' rent-avoidance efforts depends on the comparison between the true social cost of monopoly $E(TSC)$ and $n_c(P_m) - n_f(P_m) = H$. Consumer participation increases social welfare $E(TSC) < n_c(P_m) - n_f(P_m)$ if:

$$\begin{aligned} & -2n_f(P^*)((n_c(P_m) - n_f(P_m)) - (n_c(P^*) - n_f(P^*))) + (n_f(P^*))^2 \\ & < (n_c(P_m) - n_f(P_m))(n_c(P^*) - n_f(P^*)). \end{aligned} \quad (D.7)$$

Note that, since $n_c(P_m) - n_f(P_m) > n_c(P^*) - n_f(P^*)$ and $n_c(P_m) > n_c(P^*)$, there exist α and $\beta, 0 < \alpha, \beta < 1$, such that $\alpha(n_c(P_m) - n_f(P_m)) = n_c(P^*) - n_f(P^*)$ and $\beta n_c(P_m) = n_c(P^*)$. Using α and β we can rewrite Eq. (B.19) as:

$$(\beta n_f(P_m))^2 - 2\beta n_f(P_m)(1 - \alpha)(n_c(P_m) - n_f(P_m)) - \alpha(n_c(P_m) - n_f(P_m))^2 < 0. \quad (D.8)$$

We therefore conclude that:

Proposition D1: *Consumer participation reduces the social cost of monopoly, if and only if,*

$$n_f(P_m) < (n_c(P_m) - n_f(P_m)) \left[\frac{(1 - \alpha) + \sqrt{(1 - \alpha)^2 + \alpha}}{\beta} \right];$$

namely,

$$T < H \left[\frac{(1 - \alpha) + \sqrt{(1 - \alpha)^2 + \alpha}}{\beta} \right].$$

Hence, two different sufficient conditions for consumer participation to be welfare enhancing are:

$$n_f(P^*) < n_c(P^*) - n_f(P^*)(T' < H') \quad \text{and} \\ n_f(P_m) < (n_c(P_m) - n_f(P_m)) \frac{\sqrt{\alpha}}{\beta} (T < \frac{\sqrt{\alpha}}{\beta} H).$$

Proposition D1 implies that the condition in the previous literature, viz., $T < H$, is neither sufficient nor necessary for consumer opposition to reduce the social cost of monopoly. If this is true in our case for $n = 1$, then the conclusion certainly applies in the general case where n is greater than 1. The incidence of the welfare-enhancing effect of consumer monopoly rent-avoidance activities does not necessarily contribute to the positive assessment predicted by the existing studies that assume that the contested monopoly price is the profit-maximizing monopoly price under certainty, P_m , and not the expected payoff-maximizing price under uncertainty, P^* . Whether the previous analyses are biased in a particular direction depends on the nature of the demand and supply functions. Specifically, the bias depends on the relative decline of H and T corresponding to the decline from P_m to P^* . If the reduction in deadweight loss is lower than the reduction in the monopoly profit, then the defensive activities of the consumers are welfare enhancing, despite the fact that the condition specified in Lemma D1, $H > T$, may not hold.

So far we have been concerned with the welfare effect of consumer opposition to the awarding of monopoly status under the two alternative assumptions regarding the contested monopoly price, $P = P_m$ and $P = P^*$. We conclude by comparing the social cost of monopoly under these two contested monopoly prices, when in both cases consumers oppose the awarding of a monopoly status to the firm.

The expected social costs of monopoly under P_m and P^* , $E(SC)$ and $E(TSC)$, are given in Eq. (D.3) and Eq. (D6). Lobbying for P^* rather than for P_m is preferred from the viewpoints of both the potential monopoly and consumers. The expected social cost thus decreases (expected social welfare increases) as a result of consumers participation (see Leidy 1994 for a similar result). That is,

Lemma D3: $E(TSC) < E(SC)$.

The social cost of monopoly under the lobbying target P^* is clearly reduced relative to the contest where the lobbying target is P_m , if the firm wins the monopoly license. Lemma 3 implies therefore that the former contest is a Pareto improvement relative to the latter contest both ex-ante and ex-post. This is neglected by Ellingsen (1991), Schmidt (1992), and Baik (1999).

Proposition D2: *With consumer opposition the firm will lobby for P^* rather than for the profit-maximizing monopoly price P_m . Both ex-ante and ex-post, the contest where the lobbying target is P^* constitutes a Pareto improvement relative to the contest where the lobbying target is P_m .*

Note that, despite this result, it is still not clear whether the condition stated in Proposition D2 holds or not. The condition stated in Lemma D1 is, however, a sufficient (*not* necessary) condition for consumers' participation to decrease the social cost of a monopoly.

By Proposition D2, the existing sufficient and necessary condition for consumers' rent defending activities to be beneficial is only a sufficient condition. Proposition D2 implies that the contest studied in this chapter where the lobbying target is the price that maximizes the firms expected net payoff P^* is a Pareto improvement, both ex-ante and ax-post, relative to the contest studied in the literature where the lobbying target is the profit-maximizing monopoly price P_m .

XI

Strategic Restraint

Economic policy is often the outcome of a (political) game-contest between interest groups. Moreover, the contest between interest groups frequently involves a struggle between one group that defends the status-quo and other groups that challenge it by fighting for alternative policies. For example, a tax reform may involve a struggle between different industries. Existing pollution standards may be defended by the industry and challenged by an environmentalist interest group. A monopoly can face the opposition of a customers coalition fighting for appropriate regulation. Capital owners and a workers union can be engaged in a contest that determines the minimum wage, and so on. The outcome of the contest depends on the stakes of the contestants and, in turn, on their exerted (fighting, lobbying, rent-seeking) efforts. The realized, ex-post, payoff configuration of the interest groups depends on the policy proposal that actually emerges as the winner of the contest.

In the previous chapter we presented a special case of the above setting. See, for example, Baik (1999), Ellingsen (1991) and Schmidt (1992) who analyzed the welfare effect of consumer opposition to the existence of monopoly rents. In these studies policy proposals are exogenous. Furthermore, the status-quo policy and the policy proposed by a single challenger are assumed to coincide with the contestants' optimal policies under certainty conditions where there is no opposition. Although these workers have recognized that interest groups' awareness to the existence of an opposition may affect their efforts, they disregarded the possible effects of such awareness on their proposed policies. An interest group may prefer a proposal that reduces its (certain) benefit in case of winning the contest, if it anticipates a sufficient increase in the winning probability of that more moderate proposal, thus increasing its expected payoff. In particular, the challenger of the status quo may be induced to propose a policy that is closer to the status-quo policy and the defender of that policy may prefer to propose a new policy that to some extent compromises with the optimal strategy of the challenger.

The main purpose of this chapter is to extend the analysis of economic policy determination by allowing the endogenous formation of the proposed

policies – the lobbying targets. In the proposed general setting, in a first stage interest groups decide which policy to lobby for and, then, in a second stage, engage in a contest over the proposed policies. Using as a benchmark a status-quo policy that is the preferred policy of one interest group (the status-quo defender) when there is no opposition, we establish that the status quo is not an equilibrium strategy of “the defender”. Likewise, the equilibrium proposal of “the challenger” differs from his optimal proposal when he does not face any opposition. Both interest groups choose more moderate positions. Hence, competition over endogenously determined policies reduces polarization and, in turn, wasteful lobbying activities. Such competition cannot result, however, in a (strategic) compromise where the two interest groups share the same equilibrium proposal and so entirely avoid the expenditure of wasteful resources. The extended competition over the endogenously determined proposals can therefore still be inefficient relative to a real compromise.

Our attempt to endogenize the proposed policies and therefore the contestants’ payoffs is related to the literature on optimal contest design. In contrast to that literature, however, where a contest designer (a bureaucrat or an elected politician) is assumed to control the contestants’ payoffs, Appelbaum and Katz (1987), Kohli and Singh (1999) and what was presented in Chap. IV in this book, in the current model the contestants themselves determine their payoffs. Chung (1996) and Gradstein (1993) also analyze the endogenous determination of payoffs. Their setting is different and somewhat restrictive, first because the payoffs of the contestants are symmetric and, second because the variability of the contested prize is only reached via its dependence on the aggregate efforts of the contestants. See also Ursprung (1990) and Sun and Ng (1999). Our result is also related to the studies of Cairns and Long (1991), Glazer and McMillan (1992), and Leidy (1994) on voluntary price regulation. Using different settings inspired by Becker’s (1983) pressure model, these authors show that, within a monopoly context, the threat of price regulation due to an effective political opposition by consumers may induce the monopolist to price below the unregulated price. Finally, our result is also related to the results presented in the previous chapter that focuses on the social cost of monopoly within a more restricted framework and to Graichen, Requate and Dijkstra (2001) that examines the optimal policy of a monopoly when it faces an environmentalist pressure group.

1 The Model

a An Overview

As in Part B Chapter VI, suppose that a status-quo policy is challenged by one interest group and defended by another group. This policy can be the price of a regulated monopoly, the maximal degree of pollution the government allows or the existing tax structure. The defender of the status-quo policy

(henceforth interest group d) prefers the status-quo policy I_s to any alternative policy. The challenger of the status-quo policy (interest group c) prefers the alternative policy I_a . Without any loss of generality, it is assumed that $I_s \leq I_a$ and that the policy I_s (I_a) is the optimal policy proposal of the defender (the challenger), provided that his supported policy gains *certain approval*. That is, disregarding the possibility that his proposed policy can be rejected, in which case the policy proposed by the rival interest group is assumed to be approved. For example, in the contest over monopoly regulation studied described in the previous chapter, the monopoly firm defends the status quo, lobbying for the profit-maximizing monopoly price (against any price regulation), while the consumers challenge the status-quo lobbying for the competitive price (a tight price cap).

The actual implemented policy depends on the contest between the interest groups on the approval of their proposed policies. These proposed policies that are endogenously determined in our extended setting are denoted I_c and I_d . The outcome of the political contest is given in terms of the probabilities Pr_c and Pr_d that the interest groups c and d win the contest. The outcome of the contest depends on the stakes of the contestants and, in turn, on their proposed policies and on their exerted lobbying or rent-seeking efforts. In contrast to Chapter IV, the government is not introduced as a player in the policy-determination game. However, the important role of the political environment (the form of the government, its motivation and the decision rule it applies) is represented by the commonly used contest success function that specifies the relationship between the outcome of the contest and the proposed policies or the efforts of the interest groups.

b Equilibrium

The interest groups make two types of decisions. In the first stage of the game they noncooperatively select their proposed policies, the lobbying targets, I_c and I_d . In the second stage they engage in a contest over the approval of the proposed policies. The interest groups are assumed to precommit on their proposed policies.^{84,85} The means of the interest groups to affect the outcome of the contest, viz. their winning probabilities, in the second stage of the game is their lobbying or rent-seeking efforts x_c and x_d .⁸⁶ Given the policy proposals

⁸⁴ For different rent-seeking games with an explicit time structure that allow for such commitment, see Baik and Kim (1997), Baik and Shogren (1992), Baye and Shin (1999), Dixit (1987) and Leininger (1993).

⁸⁵ We assume that the commitments are feasible and are fully implemented after the contest. For example, in the case of a regulated monopoly the price commitment is enforced by the regulator.

⁸⁶ x_c and x_d are total lobbying efforts. An implicit assumption is thus made that the interest groups are able to fully overcome the free-riding effects.

I_c and I_d and the utility functions U_c and U_d , the stakes of the interest groups are

$$N_c(I_c, I_d) = U_c(I_c) - U_c(I_d) \quad \text{and} \quad N_d(I_c, I_d) = U_d(I_d) - U_d(I_c). \quad (\text{D.9})$$

The utility functions U_c and U_d are assumed to be monotonic, continuous and twice differentiable on the interval $[I_s, I_a]$ and recall that they are maximized, respectively, at the policies I_a and I_s , $I_s \leq I_a$. Notice that when $I_c = I_d$ both stakes are equal to zero and that $\partial N_c / \partial I_d < 0$ and $\partial N_d / \partial I_c > 0$ on the interval $[I_s, I_a]$.

As in Eq. (A.2) the expected net payoff (surplus) of the risk-neutral challenger and defender are, respectively, given by ⁸⁷

$$E(w_c) = U_c(I_d) + \text{Pr}_c N_c(I_c, I_d) - x_c, \quad (\text{D.10})$$

and

$$E(w_d) = U_d(I_c) + \text{Pr}_d N_d(I_c, I_d) - x_d. \quad (\text{D.11})$$

In our two-stage game with full information a subgame perfect equilibrium can be calculated by using the following backward induction procedure. The equilibrium effort levels determined at the second stage are interior (x_c and x_d are positive). Such equilibria need not be unique. An interior equilibrium is characterized by the following conditions ($\frac{\partial E(u_i)}{\partial x_i} = 0 \quad \forall i = c, d$) (see also Eq. (C.2)):⁸⁸

$$\Delta_i = \frac{\partial \text{Pr}_i}{\partial x_i} N_i - 1 = 0 \quad \forall i = c, d. \quad (\text{D.12})$$

Thus, the first-order conditions require that (see Eq. (C.3)):

$$\frac{\partial \text{Pr}_i}{\partial x_i} = \frac{1}{N_i} \quad \forall i = c, d. \quad (\text{D.13})$$

By total differentiation of the first-order conditions we obtain a generalization of Eq. (C.4), that the Nash equilibrium rent-seeking rent-avoidance activities satisfy the following conditions:

$$\frac{\partial x_i}{\partial I_j} = \frac{\frac{\partial \Delta_i}{\partial x_j} \frac{\partial \Delta_j}{\partial I_j} - \frac{\partial \Delta_j}{\partial x_i} \frac{\partial \Delta_i}{\partial I_j}}{\frac{\partial \Delta_i}{\partial x_i} \frac{\partial \Delta_j}{\partial x_j} - \frac{\partial \Delta_j}{\partial x_i} \frac{\partial \Delta_i}{\partial x_j}} \quad \forall i \neq j \quad \text{and } i, j = c, d. \quad (\text{D.14})$$

⁸⁷ Notice that $E(w_j) = \text{Pr}_i U_j(I_i) + \text{Pr}_j U_j(I_j) - x_j$. Thus

$$E(w_j) = U_j(I_i) + \text{Pr}_j N_j(I_j, I_i) - x_j \quad \text{for } i \neq j \quad \text{and } i, j = c, d.$$

⁸⁸ The sufficient second-order conditions of such equilibria are assumed to be satisfied.

We thus obtain that:

$$\frac{\partial x_d^*}{\partial I_c} = \frac{N_d \frac{\partial^2 \text{Pr}_c}{\partial x_d \partial x_c} \frac{\partial \text{Pr}_c}{\partial x_c} \frac{\partial N_c}{\partial I_c} - N_c \frac{\partial^2 \text{Pr}_c}{\partial x_c^2} \frac{\partial \text{Pr}_d}{\partial x_d} \frac{\partial N_d}{\partial I_c}}{N_d N_c \left(\frac{\partial^2 \text{Pr}_c}{\partial x_c^2} \frac{\partial^2 \text{Pr}_d}{\partial x_d^2} - \frac{\partial^2 \text{Pr}_d}{\partial x_d \partial x_c} \frac{\partial^2 \text{Pr}_c}{\partial x_d \partial x_c} \right)}, \quad (\text{D.15})$$

and

$$\frac{\partial x_c^*}{\partial I_d} = \frac{N_c \frac{\partial^2 \text{Pr}_d}{\partial x_d \partial x_c} \frac{\partial \text{Pr}_d}{\partial x_d} \frac{\partial N_d}{\partial I_d} - N_d \frac{\partial^2 \text{Pr}_d}{\partial x_d^2} \frac{\partial \text{Pr}_c}{\partial x_c} \frac{\partial N_c}{\partial I_d}}{N_d N_c \left(\frac{\partial^2 \text{Pr}_c}{\partial x_c^2} \frac{\partial^2 \text{Pr}_d}{\partial x_d^2} - \frac{\partial^2 \text{Pr}_d}{\partial x_d \partial x_c} \frac{\partial^2 \text{Pr}_c}{\partial x_d \partial x_c} \right)}. \quad (\text{D.16})$$

c The Interest-groups' Optimal Policies

The question we now wish to consider is what are the proposed policies that the interest groups prefer. The interior equilibrium policy proposals of the two interest groups are characterized by

$$\frac{\partial E(u_c)}{\partial I_c} = 0 \quad \text{and} \quad \frac{\partial E(u_d)}{\partial I_d} = 0. \quad (\text{D.17})$$

Notice that since I_a maximizes U_c , it also maximizes $N_c(I_c, I_d)$, for any given I_d that differs from I_a . Similarly, I_s maximizes $N_d(I_c, I_d)$, for any given I_c that differs from I_s . By assumption then, $\frac{\partial N_c(I_c, I_d)}{\partial I_c} = 0$, if $I_c = I_a$ and $\frac{\partial N_d(I_c, I_d)}{\partial I_d} = 0$, if $I_d = I_s$, even if $I_c = I_s$.

The policy I_i ($i = c, d$) that maximizes interest group i 's expected payoff $E(u_i)$ is characterized by the following first-order condition: $\forall i \neq j$ and $i, j = c, d$,

$$\frac{\partial E(u_i)}{\partial I_i} = \frac{\partial \text{Pr}_i}{\partial x_i} \frac{\partial x_i}{\partial I_i} N_i + \frac{\partial \text{Pr}_i}{\partial x_j} \frac{\partial x_j}{\partial I_i} N_i + \text{Pr}_i \frac{\partial N_i}{\partial I_i} - \frac{\partial x_i}{\partial I_i} = 0. \quad (\text{D.18})$$

Given Eq. (D.13), we rewrite Eq. (D.18),

$$\frac{\partial E(u_i)}{\partial I_i} = \frac{\partial \text{Pr}_i}{\partial x_j} \frac{\partial x_j}{\partial I_i} N_i + \text{Pr}_i \frac{\partial N_i}{\partial I_i} = 0. \quad (\text{D.19})$$

It is assumed that the utility functions U_c and U_d are differentiable at the optimal policies I_s . This implies that the first-order effect of moving away from the ideal policies has a second-order effect. By definition, $\left. \frac{\partial N_c(I_c, I_d)}{\partial I_c} \right|_{I_c=I_a} = 0$, $\left. \frac{\partial N_d(I_c, I_d)}{\partial I_d} \right|_{I_d=I_s} = 0$, $\left. \frac{\partial N_c(I_c, I_d)}{\partial I_d} \right|_{I_d=I_s} < 0$ and $\left. \frac{\partial N_d(I_c, I_d)}{\partial I_c} \right|_{I_c=I_a} > 0$. Hence, from Eqs. (D.15) and (D.16), $\left. \frac{\partial x_c}{\partial I_d} \right|_{I_d=I_s} < 0$ and $\left. \frac{\partial x_d}{\partial I_c} \right|_{I_c=I_a} > 0$. Since, by assumption, $\frac{\partial \text{Pr}_i}{\partial x_j} < 0$, we obtain that $\left. \frac{\partial E(u_c)}{\partial I_c} \right|_{I_c=I_a} < 0$ and $\left. \frac{\partial E(u_d)}{\partial I_d} \right|_{I_d=I_s} > 0$. This means that around the ideal policy of each of the players, the equilibrium contest effort does not increase as a result of reduced polarization.

The latter two inequalities directly imply that, as long as the two interest groups engage in a viable contest in the second stage of the game, in equilibrium the two interest groups are induced to voluntarily moderate their proposals relative to their best policies when there is no opposition.⁸⁹ Specifically, the equilibrium policies I_c^* and I_d^* satisfy: $I_c^* < I_a$ and $I_d^* > I_s$. That is

Proposition D3: *Competition over endogenously determined policy proposals reduces polarization.*

The intuition for this result is as follows: If there is no opposition the challenger chooses the policy I_a . In the presence of an opposition, the challenger realizes that lowering his proposal below I_a leads to a decrease of his payoff from winning the contest. But the more restrained proposal yields an increase in the payoff of the opponent and, in turn, a reduction in his stake that induces him to become less aggressive. The resulting decline in the defender's probability of winning the contest clearly benefits the challenger. Since the latter favorable effect dominates the former unfavorable effect, the challenger prefers to restrain his lobbying target, i.e. propose a policy below I_a . A similar intuition explains the readiness of the defender of the status quo to moderate his position by proposing a policy that exceeds I_s .⁹⁰

What is needed for this result is that the rent-seeker's marginal cost from a moderation of his position is zero, because he starts his moderation from an ideal point at which the first-order condition holds. Hence, a marginal moderation reduces his gain from winning only by a second-order effect. However, this moderation has a first-order effect on the opponent's incentive to engage in rent-seeking efforts and, consequently, on the winning probability. Accordingly, the marginal benefit exceeds the marginal cost.

Baik (1999), Ellingsen (1991) and Schmidt (1992) study the welfare effect of consumer opposition to the existence of monopoly rents sharing the assumption that the contested alternatives are the standard textbook profit-maximizing price and the competitive consumer-surplus-maximizing price. Proposition C5 implies that, as long as the alternative prices are endogenously selected by the monopoly firm and by its customer coalition, the firm would voluntarily support some price regulation and the consumers would not lobby for a tight price cap.⁹¹ Our result has a broad applicability as the framework

⁸⁹ We disregard corner solutions.

⁹⁰ Chapter X studies a considerably less general contest between a consumer and a potential monopoly, using a specific contest success function (Tullock's special case) and allowing only the potential monopoly to propose its desirable target/policy. Their analysis of the social cost of monopoly is based on a result that is implied by Proposition D3.

⁹¹ For related results in the special context of monopoly regulation, see Cairns and Long (1991) and Glazer and McMillan (1992). Using the different setting of Becker's (1983) pressure model, these authors show that the monopolist is

we are suggesting naturally fits numerous contexts where economic policy is the outcome of interest-group pressures that may take the form of lobbying, rent-seeking, bribes or campaign contributions.

Although polarization is reduced, it is not eliminated. That is, an equilibrium with completely converging proposed policies is impossible. To prove this claim, suppose, to the contrary, that (I^*, I^*) is such an equilibrium. Then, by the definition of Nash equilibrium, for every I_c , $U_c(I^*)$ exceeds $E(U_c(I_c, I^*))$. Recall that $E(U_c(I_c, I^*)) = U_c(I^*) + (\text{Pr}_c(I_c, I^*)N_c(I_c, I^*) - x^*(I_c, I^*)) = U_c(I^*) + A(I_c, I^*)$. Since $A(I_c, I^*)$ is positive when I_c is associated with a positive stake and I^* differs from such I_c , $E(U_c(I_c, I^*))$ exceeds $U_c(I^*)$. The obtained contradiction implies that (I^*, I^*) cannot be an equilibrium, which proves our claim. Namely,

Proposition D4: *The equilibrium policy proposals of the interest groups cannot coincide.*

The intuition behind this result is as follows: for both interest groups, a deviation from any agreed upon compromise results in a first-order increase in the expected payoff, $\text{Pr}_i(I_i, I^*)N_i(I_i, I_j)$, and a second-order reduction in the expected payoff, $-x_i$. Consequently, both interest groups are induced to deviate from any agreed upon proposal and conflict is a necessary outcome of the interaction in our game.⁹² Since there always remain effective incentives for the interest groups to engage in a viable contest, wasteful resources are expended in the second stage of the game. Note that the interest groups could, of course, increase their expected payoffs by agreeing to cut down their lobbying efforts by the same proportion. This implies that the equilibrium of the policy-determination game is inefficient.⁹³

Competition over endogenously determined policy proposals reduces the polarization between the positions of interest groups. In particular, each group restrains its proposal relative to its optimal proposal under certainty. Although the interest groups voluntarily restrain their proposals, they are nevertheless induced to engage in a wasteful contest as complete agreement is not an equilibrium outcome.

Our result has broad applications. It rationalizes the self-restraint of interest groups such as firms investing in pollution control or voluntarily adopting

induced to price below the unregulated profit-maximizing price. The former authors argue that the monopolist takes into account the effect of his price on the probability that regulation is imposed by the legislator. Self-regulation is his way to permit government regulation. The latter authors argue that lack of knowledge by the monopolist of just how much can be extracted from consumers before they will be induced to mount an effective political opposition induces him to accept a lower price.

⁹² A different result can be obtained if the interest groups are allowed to be risk averse or in a different one-time interaction setting, see Skaperdas (1992).

⁹³ Note that full dissipation of the rent may occur in this contest.

cleaner production processes or such as environmentalists who do not maintain a zero-pollution target. It explains why monopolists are induced to self-regulate their price and why their customer coalitions do not insist on a tight price cap. It also implies that an interest group's support of a welfare program or of any policy that has redistribution effects need not reflect its altruistic preferences, but rather its egotistic strategic restraint. This result is somewhat related to the voting literature where two parties choosing platforms may have an incentive to moderate their positions and often to converge to the same platform (the median-voter's ideal position).

The robustness of our result needs to be examined with respect to an increase in the number of interest groups that propose policy proposals. Another possible worthwhile extension is the endogenization of the contest success function by adding the government (the elected politicians, the bureaucrats or both) as an active player in the policy-determination game.

Applications

In this part of the book we consider five different applications of the extended contests presented in Parts B and D. While the applications of monopoly price determination, privatization, migration policy and minimum wage assume that the contest success function is Tullock's simple lottery, the last tournament application allows the more general CSF's of Chapter VII.

XII

Monopoly-price Determination

In representative democracies monopoly price is determined by a political process that reflects the interest of the government (a bureaucrat, a regulator, a politician) that proposes the pricing policy and the pressures exerted by the producer, the potential monopoly, and by the consumers on the ruling politicians who approve or reject the proposed price. The producer is interested in securing the rent associated with the approval of the proposed price while the consumers prefer that the proposed price be rejected, thus avoiding a reduction in their surplus.

Our proposed game of monopoly regulation extends the existing models in the literature on monopoly price, Tirole (1988), monopoly rent-seeking contests, Krueger (1974), Peltzman (1976), Posner (1975), Tullock (1980), Tollison (1982) and monopoly rent-seeking rent-avoidance contests, Appelbaum and Katz (1986), Baik (1999), Ellingsen (1991), Paul and Wilhite (1991), Schmidt (1992) and Wenders (1987) by:

1. determining the monopoly price assuming that it maximizes a composite utility function that depends on two components: the expected social welfare and the lobbying efforts exerted by the interest groups. The welfare component has a positive or no effect on the utility, while the total lobbying outlays have a positive, negative or no effect on the utility.
2. introducing the political culture of the government and clarifying its role in the endogenous determination of monopoly price. The weights assigned to each of the components can be interpreted as the political culture of the government.

Our model has an alternative interpretation that can clarify the roles played by bureaucrats, incumbent politicians, potential monopolies and consumers on the endogenous determination of monopoly price. More specifically, following Chapter IV, the proposed framework enables a distinction between the role of the bureaucrat who proposes the monopoly price and the role of the incumbent politician who approves or rejects the proposal. The politician

faces an information problem, viz., he lacks information regarding the costs and benefits of the proposal. His decision is therefore uncertain depending, nevertheless, on the efforts made by the interest groups to convince him to vote in favor or against the proposed policy. Consequently, the bureaucrat and the interest groups consider the outcome of the lobbying contest they take part in to be uncertain.⁹⁴

Our modeling of the endogenous determination of monopoly price is related to the approach proposed by Appelbaum and Katz (1987), namely, that governments seek rents by setting rents and, more generally, to the recent literature on optimal contest design (Amegashie (1999), Baye, Kovenock and de Vries (1993), Clark and Riis (1998), Dasgupta and Nti (1998), Gradstein (1998), Morgan (1998), Nitzan (1994)), where the structure of the contest is determined by a politician. It is also related to the strategic trade literature (Grossman and Helpman (1994); Rodrik (1994); Rama and Tabellini (1995)) and to the earlier nonstrategic trade literature (Hillman (1982), (1989); Mayer (1984); Rodrik (1986)) where trade policy is endogenously determined by elected politicians.

The second extension enables us to predict different patterns of monopoly regulation in different political economic environments. Our notion of political culture is related to the welfare weight parameter in the composite utility function of the government, see van Winden (1999) for a survey of studies where such an assumption is made.

In order to focus our discussion, we adopt the first interpretation. That is, we assume that the regulator (politician or bureaucrat) determines the monopoly price via maximization of a composite utility function, disregarding the distinction within the government between bureaucrats and politicians and their different roles. Toward the end of the chapter we discuss the alternative interpretation and clarify why the model fits the more complex decision-making process in a two-tier government. The main objective of this chapter is to examine how changes in the parameter representing political culture affect monopoly regulation and, in turn, the rent-seeking rent-avoidance efforts of the producer and the consumers and their aggregate expected benefit.

1 The Game of Monopoly Regulation

In our game of monopoly regulation there are three players. The first one is the regulator who sets and proposes the regulated monopoly price I . His proposal along with the status-quo price constitutes the agenda.

The regulation game is based on the following main assumptions: There are only two interest groups that can affect the probability of rejection/approval

⁹⁴ As in Peltzman (1976) the government sets a price, however, in our extended framework the regulator is not taken as equivalent to an elected politician, but is considered as an interest group.

of the proposed policy; the expenditures incurred by the interest groups can be transfers and/or wasteful resources; the contest is resolved by the standard symmetric Tullock's (1980) contest success function (CSF); the regulator is a leading player and, finally, the political culture is exogenous. The robustness of the results to these assumptions will be discussed while presenting the analysis and in the concluding remarks.

We first present the contest on the approval of the regulator's proposal, the rent-seeking rent-avoidance contest. In this contest, in fact, subgame of the regulation game, the two players choose their strategies (the rent-seeking outlays) given (a) the proposed monopoly price I and (b) the contest success function, CSF, that represents the uncertainty associated with the regulator's behavior, beyond his setting the agenda. This function transforms the rent-seeking rent-avoidance efforts of the contestants into probabilities of approval and rejection of the proposed monopoly price I . Notice that the existence of a CSF might be due to an information problem faced by the regulator who may not know, for example, the true production costs of the regulated enterprise. The rent-seeking game is thus viewed as a "black box" or a reduced form of the outcome of the regulatory process. The contest success function reflects the combined effect of the regulator's information problem and the lobbying efforts of the interest groups. The latter may consist of direct transfers or of the wasteful lobbying efforts associated with information transmission by the interest groups.⁹⁵

We examine the Nash equilibrium of the two-player contest on the approval of the regulator's proposal. We then complete the presentation of the game of monopoly regulation in which the regulator's preferred policy is set taking into account his political and professional commitments, his narrow self-interest and the political constraint that he faces, namely, the equilibrium outcome in the rent-seeking rent-avoidance subgame (contest).

Being a regulated monopoly, a producer may charge some price I that differs from the status-quo constrained surplus-maximizing price P_{mc} , the price at which the marginal cost curve intersects the demand curve.^{96,97} The price I , which is typically higher than P_{mc} , can be equal to or lower than the standard profit-maximizing monopoly price P_m ⁹⁸ (see Fig. E.1, which is a modified figure of A.1). The quantities corresponding to approval and rejection of the proposed price I are $q(I)$ and $q(mc)$. The producer's payoff in the event that

⁹⁵ To facilitate the exposition, we assume in the sequel that the rent seeking efforts are transfers. Our results are valid, however, in the general case where only part of these efforts are transfers.

⁹⁶ We disregard the producer's fixed costs, assuming that his normal profit is sustained for any price that is equal to or higher than P_{mc} .

⁹⁷ An alternative candidate for the status-quo price is the unregulated standard profit-maximizing monopoly price P_m . Our results are robust to the selection of the status-quo price.

⁹⁸ A price cap I higher than P_m is ineffective because even if such a price is approved the monopoly would charge the advantageous lower price P_m .

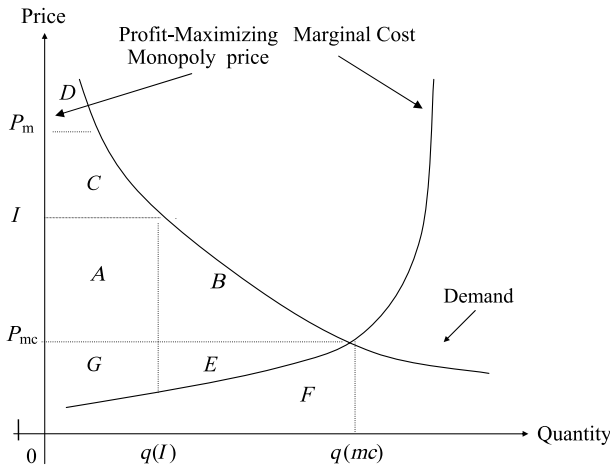


Fig. E.1.

he wins the contest is equal to the monopoly profit at price I , $A(I) + G(I)$. In such a case the consumers' surplus is given by $D(I) + C(I)$. The consumers' payoff if they win the contest is equal to their surplus under the competitive price, $D(I) + C(I) + A(I) + B(I)$. In such a case the producer's payoff is given by $G(I) + E(I)$. Note that, in general, the payoffs of the players under the two possible outcomes of the rent-seeking rent-avoidance contest, viz., the players' payoffs corresponding to approval and rejection of the price depend on I .

With probability Pr_c the ruling politician rejects the proposed price I . This implies that he approves the preferred price of the consumers, P_{mc} . With probability Pr_f the ruling politician approves the proposed price I . We denote by x_f and x_c the rent-seeking and rent-avoidance expenditures of the risk-neutral players: the producer and the consumers. These expenditures determine the probability of approval of the policy proposed by the regulator. The total rent-seeking rent-avoidance outlays ($x_f + x_c$) represent transfers to the government (the ruling politician and/or the bureaucrat).⁹⁹

The expected net payoff (surplus) of the consumers and the producer are, respectively, given by

$$E(w_c) = \text{Pr}_c(A(I) + B(I) + C(I) + D(I)) + \text{Pr}_f(C(I) + D(I)) - x_c, \quad (\text{E.1})$$

and

$$E(w_f) = \text{Pr}_f(A(I) + G(I)) + \text{Pr}_c(E(I) + G(I)) - x_f. \quad (\text{E.2})$$

⁹⁹ As noted earlier, the rent-seeking and rent-avoidance expenditures, x_f and x_c , could also be resources wasted in the contest. Whether the outlays are wasted resources or transfers is reflected by the sign of the weight assigned to these outlays in the objective function of the government. To simplify the presentation, see footnote 95, we assume that these outlays are transfers. Relaxing this assumption would not alter our results.

Let us assume that the demand and marginal cost functions are continuous and twice differentiable in I . This assumption implies that $A(I)$, $B(I)$, $C(I)$ and $D(I)$ are continuous and twice differentiable in I .

Let $n_c = (A(I) + B(I))$ and $n_f = (A(I) - E(I))$ denote, respectively, the contest stakes of the consumers and the producer. Notice that $n_c > n_f$, i.e. $A(I) - E(I) < A(I) + B(I)$ and that the deadweight loss associated with the approval of the proposed monopoly price is given by $B(I) + E(I)$.

The probabilities Pr_c and Pr_f are obtained by the contest success function. This function transforms the two players' rent-seeking rent-avoidance expenditures into probabilities of securing their preferred policy outcome. We assume that the contest outcome is determined by Tullock's (1980) commonly used nondiscriminating rule. The conditions characterizing an interior equilibrium of our two-player contest (subgame) are given by Eq. (A.6), the rent the equilibrium rent-seeking rent-avoidance expenditures of the two players are given by Eq. (A.8) and the equilibrium probabilities are given by Eq. (A.9).

2 The Proposed Monopoly Price and the Contestants' Stakes, Efforts and Winning Probabilities

From the expressions in Eqs. (A.8) and (A.9) that specify the equilibrium rent-seeking outlays of the players and their probabilities of winning the contest, we directly obtain that under our stylized assumptions the player with the higher stake representing the consumers invests more resources in rent-seeking activities and has a greater probability of winning the contest than the producer. These results are known and are well established in the literature (for example, see Baik, 1994a, and Nti, 1999). The probability that the socially inefficient monopoly price will be set is therefore smaller than the probability of the more efficient outcome, namely that the price is the competitive one.¹⁰⁰ Note that despite this result the antimonopoly activity of the consumers is not necessarily beneficial, that is, the social cost of monopoly is not necessarily reduced as established by Baik (1999), Ellingsen (1991) and Schmidt (1992).

The effect of a change in the proposed price I on the extent of the equilibrium rent-seeking rent-avoidance activities of the two players is:

$$\frac{\partial x_c^*}{\partial I} = \left(n_f'(I) (n_c(I))^2 (n_c(I) - n_f(I)) + 2n_c(I) n_f^2(I) n_c'(I) \right) \frac{1}{(n_c(I) + n_f(I))^3}, \quad (\text{E.3})$$

¹⁰⁰ This efficiency criterion has been used by Ellingsen (1991), Fabella (1995), Hurley (1998) and Morgan (1998).

and

$$\frac{\partial x_f^*}{\partial I} = n_c n_f n'_f (n_f - n_c) \left[\frac{\eta_c}{\eta_f} + 2 \frac{n_c}{n_f - n_c} \right] \frac{1}{(n_c(I) + n_f(I))^3}, \quad (\text{E.4})$$

where $\eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j} = n'_j \frac{I}{n_j}$ is the elasticity of player j 's stake (benefit) with respect to a change in the proposed price I .

Note that for $P_m > I > P_{mc}$, $\frac{\partial n_j}{\partial I} = n'_j > 0$, $\forall j = c, f$. We can therefore conclude that $\frac{\partial x_c^*}{\partial I} > 0$ and $\frac{\partial x_f^*}{\partial I} < 0$ if $\frac{\eta_c}{\eta_f} > -2 \frac{n_c}{n_f - n_c}$.

The consumers' investment in the contest is directly related to changes in the proposed price I , while the effect of such changes on the extent of rent-seeking activities of the producer is ambiguous. Due to the potential monopoly's awareness to the increased rent-avoidance efforts of the consumers, he may reduce his rent-seeking efforts. This situation arises when his relatively low incentives (recall that his stake is the lower one) are enforced by second-order inferiority, that is, η_f/η_c being sufficiently small. This additional asymmetry between the players means that the elasticity of the consumers' stake with respect to the proposed price, η_c , is sufficiently higher than the elasticity of the potential monopoly's stake with respect to the proposed monopoly price, η_f . Specifically, $\frac{\eta_c}{\eta_f} > 2 \frac{n_c}{n_f - n_c}$.

The relative probabilities of winning the contest and the relative equilibrium outlays of the players are:

$$\frac{\text{Pr}_c^*}{\text{Pr}_f^*} = \frac{x_c^*}{x_f^*} = \frac{n_c(I)}{n_f(I)} = \frac{A(I) + B(I)}{A(I) - E(I)}. \quad (\text{E.5})$$

Equation (E.5) is known and well established in this literature. In equilibrium then the players' relative probabilities of winning the contest are equal to their relative expenditures and to their relative stakes. Denote by X the total rent-seeking rent-avoidance outlays. In equilibrium $X^* = x_c^* + x_f^* = \frac{n_c(I)n_f(I)}{n_c(I) + n_f(I)}$ (see Eq. (B.6)).

From Eq. (B.7), the effect of a change in the proposed monopoly price I on the total contestants' outlays is:

$$\frac{\partial X^*}{\partial I} = \frac{n_f(I)n_c(I)n'_f(I)}{(n_c(I) + n_f(I))^2} \left(\frac{\eta_c}{\eta_f} + \frac{n_c(I)}{n_f(I)} \right). \quad (\text{E.6})$$

From Eq. (E.6) we obtain that $\frac{\partial X^*}{\partial I} > 0$. That is, the total rent-seeking outlays of the contestants are directly related to the proposed monopoly price. In particular, an increase in the proposed price induces larger total efforts. This result implies that even when such an increase induces the producer to reduce his rent-seeking efforts, this reduction is more than counterbalanced by the increase in the rent-avoidance efforts of the consumers.

As discussed in Part B, Sect. IV.1.d, being aware of the contest between the producer and the consumers, the proposed monopoly price I is determined

by the maximization of the regulator's objective function $G()$ that depends on the expected welfare of the players and on their total lobbying transfers and is of the general form

$$G(E(w_c); E(w_f); (x_c + x_f)) . \quad (\text{E.7})$$

$E(w_c)$ and $E(w_f)$ are the expected net payoff of the consumers and the producer. The sum of these net payoffs is referred to as the expected social welfare of the public that in our case consists of the two interest groups competing on the rents associated with the proposed regulation. These rents correspond to the approval and rejection of the proposed monopoly price. The total rent-seeking rent-avoidance outlays $(x_f + x_c)$ represent either transfers to the government or resources wasted in the rent-seeking rent-avoidance contest.

Note that in Part B, Sect. IV.1.d we denoted by $\bar{E}(w_l^*)$ the equilibrium expected payoff of player l . That is, $\bar{E}(w_l^*)$ is player l 's equilibrium expected payoff when the rent-seeking rent-avoidance costs are disregarded, $E(w_l^*) = \bar{E}(w_l^*) - x_l^*$. Using a linear specification of Eq. (B.8), we assume that the regulator's objective function is of the following additive form.

$$\begin{aligned} G(.) &= \alpha (E(w_c^*) + E(w_f^*)) + (1 - \alpha) (x_c^* + x_f^*) \\ &= \alpha (\bar{E}(w_c^*) + \bar{E}(w_f^*)) + (1 - 2\alpha) (x_c^* + x_f^*) . \end{aligned} \quad (\text{E.8})$$

As explained in Part B, the parameter α determines the weight $(1 - 2\alpha)$ and, in particular, whether the second expression in the regulator's objective function is a positive or a negative welfare component. A negative weight implies that the total rent-seeking rent-avoidance outlays are considered as wasteful resources.¹⁰¹ The parameters α and $(1 - 2\alpha)$ are the weights assigned to the utility components. The regulator's mixed commitments are thus represented by α . This parameter represents the political culture of the government. It reflects the allocation of the contestants' expenditures between wasteful and nonwasteful lobbying resources. It also reflects the commitments of the regulator to the public interest and to his narrow interest of collecting the contestants' expenditures. Increased politicization, namely, a higher $1 - \alpha$, implies that the government assigns more emphasis to the transfers from the interest groups and is less concerned about welfare. A government with a short

¹⁰¹ If we would have assumed that the objective function of the government is not linear but rather:

$$\begin{aligned} G(.) &= G(\bar{E}(w_c^*) + \bar{E}(w_f^*); X^*) \\ &= \alpha g(\bar{E}(w_c^*) + \bar{E}(w_f^*)) + (1 - 2\alpha) f(x_c^* + x_f^*) , \end{aligned}$$

where g and f are monotone increasing functions that specify the utility components corresponding to the aggregate expected payoff of the public and to the total rent-seeking rent-avoidance outlays, the results obtained would not change (see Part B, IV.1.d). In this more general case the government may assign different weights to the gross payoffs of the interest groups and to the transfers.

horizon may indeed put a larger emphasis on the transfers rather than on the well being of the interest groups. The degree of politicization depends on the norms and the culture that exist in the country. If the enhancement of self-interest is a highly respected norm in the economy and bribes are tolerated to some extent, then even if the government has a long horizon, it may still assign a high weight to the transfers. In such a case, receiving transfers from the interest groups is considered by the public as a normal action that does not necessarily reduce the politicians' probability of being re-elected. This is not the case in countries where bribes and transfers are not part of the culture.

To illustrate the general applicability of the assumed objective function, we consider several special cases where α ranges between 0 and 1. When

$$\alpha = 1, \quad G(.) = (\bar{E}(w_c^*) + \bar{E}(w_f^*)) - (x_c^* + x_f^*),$$

the regulator is committed to the public interest, and the completely wasteful rent-seeking outlays are conceived as total loss to society. When

$$\alpha = 0.5, \quad G(.) = 1/2(\bar{E}(w_c^*) + \bar{E}(w_f^*))$$

and the regulator is again totally committed to the public interest. He disregards, however, the total rent-seeking outlays because they constitute a transfer to the government that is redistributed back to the public. When

$$\alpha = 1/3, \quad G(.) = 1/3((\bar{E}(w_c^*) + \bar{E}(w_f^*)) + (x_c^* + x_f^*)),$$

the nonwasteful rent-seeking outlays are transferred to the government and the regulator assigns equal weights to his utility components, depending on the rent-seeking outlays and on the aggregate expected payoff of the players. When

$$\alpha = 0, \quad G(.) = (x_c^* + x_f^*)$$

and the objective of the regulator is to maximize the rent-seeking outlays disregarding the welfare of the public. This objective function represents an extreme political culture where the regulator is totally committed to his and/or to the ruling politician's narrow interest of controlling the resources expended by the rent seekers.

3 Political Culture and Monopoly Price

When making the decision regarding the monopoly price, the regulator who is a leading player maximizes $G(.)$ being aware of the equilibrium rent-seeking rent-avoidance outlays corresponding to the possible prices. Substituting the

equilibrium values into Eq. (E.8), we obtain for $\alpha < 1/2$

$$G(I) = \alpha \left(\frac{n_c(I)}{n_f(I) + n_c(I)} \left((D(I) + C(I) + A(I) + B(I)) + (G(I) + E(I)) \right) \right. \\ \left. + \left((A(I) + G(I)) + (C(I) + D(I)) \right) \right) + (1 - 2\alpha) \left(\frac{n_c(I)n_f(I)}{n_c + n_f} \right). \quad (\text{E.9})$$

The regulator maximizes this objective function by determining the optimal level of I . The first-order condition that characterizes an interior solution of his problem (we assume that the second-order condition holds¹⁰² is

$$\frac{\partial G(.)}{\partial I} = \alpha \frac{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I} + (1 - 2\alpha) \frac{\partial (x_c^* + x_f^*)}{\partial I} = 0, \quad (\text{E.10})$$

or,

$$\frac{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I} = -\frac{(1 - 2\alpha)}{\alpha} \frac{\partial (x_c^* + x_f^*)}{\partial I}. \quad (\text{E.11})$$

Given that in our two-stage political economic game the regulator is a leading player, we can refer to the equilibrium outcome (x_c^*, x_f^*, I^*) as the Stackelberg–Nash equilibrium of the monopoly-regulation game. Such an interior equilibrium is characterized by Eqs. (A.6) and (E.11). From the above description of the objective function we conclude that an interior solution of the regulator's problem is obtained provided that $\alpha < 1/2$. The reason for this is that for $\alpha \geq 1/2$, the lobbying outlays have a negative effect on the regulator's utility. Since $\frac{\partial X^*}{\partial I} > 0$ and $\frac{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I} < 0$, it is clear that for any $\alpha \geq 1/2$ the equilibrium price is P_{mc} .

Let us turn to the study of the effect of a change in α , the parameter representing the political culture on the equilibrium price I^* . It can be verified that $\frac{\partial I^*}{\partial \alpha} = \frac{-\partial^2 G(.) / \partial I \partial \alpha}{\partial^2 G(.) / \partial I^2}$. By the second-order condition, $\frac{\partial^2 G(.)}{\partial I^2} < 0$. Using the first-order conditions, we therefore conclude that the derivative $\frac{\partial I^*}{\partial \alpha}$ and the derivative $\frac{\partial X^*}{\partial I}$ have opposite signs. That is,

Proposition E1: $\text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right) = -\text{Sign} \left(\frac{\partial X^*}{\partial I} \right) < 0$.

While in Proposition B2 we obtained an ambiguous result, in the monopoly case it is clear that $\text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right) < 0$. Hence, the proposed monopoly price

¹⁰² By the second-order condition,

$$\frac{\partial^2 G(.)}{\partial I^2} = \alpha \frac{\partial^2 (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I^2} + (1 - 2\alpha) \frac{\partial^2 (X^*)}{\partial I^2} < 0.$$

is inversely related to α . In particular, an increase in $(1 - \alpha)$, the degree of politicization of the government, tends to increase the proposed monopoly price. This Proposition can rationalize empirical evidence on different regulation patterns in different political economic environments. For example, it rationalizes the findings reported in Paul and Schoening (1991) that deal with electricity price regulation. In this study, it has been found that electricity prices are higher in states where the regulators are appointed rather than elected.

4 Political Culture and Relative Rent Dissipation

As defined in Eq. (B.23), the extent of *relative rent dissipation* (RRD) is the ratio between total rent-seeking rent-avoidance expenditures and the aggregate expected payoff of the contestants. The total equilibrium outlays of the contestants are given by $X^* = x_c^* + x_f^*$, while the aggregate expected benefit in equilibrium is given by $\bar{E}(w_c^*) + \bar{E}(w_f^*)$. The *relative rent dissipation* (RRD) rate is therefore given by $\text{RRD} = \frac{X^*}{\bar{E}(w_c^*) + \bar{E}(w_f^*)}$. The extent of relative rent dissipation depends on the proposed price I^* . We have seen that, even though a change in this price has opposite effects on the benefits of the producer and the consumers, the effect of such a change on the equilibrium rent-seeking rent-avoidance outlays is positive. The effect of such a change on RRD is

$$\frac{\partial \text{RRD}}{\partial I^*} = \frac{\frac{\partial X^*}{\partial I^*} \left(\bar{E}(w_c^*) + \bar{E}(w_f^*) \right) - \frac{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I^*} X^*}{\left(\bar{E}(w_c^*) + \bar{E}(w_f^*) \right)^2}. \quad (\text{E.12})$$

The sign of this expression is equal to the sign of the numerator of Eq. (E.12), which is equal to

$$\begin{aligned} & \frac{\partial X^*}{\partial I^*} \left(\bar{E}(w_c^*) + \bar{E}(w_f^*) \right) - \frac{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I^*} X^* \\ &= \frac{\partial X^*}{\partial I^*} \left(\left(\bar{E}(w_c^*) + \bar{E}(w_f^*) \right) + \frac{(1 - 2\alpha)}{\alpha} \right) = \frac{\partial X^*}{\partial I^*} A. \end{aligned} \quad (\text{E.13})$$

As stated above, in an interior solution $\alpha < 1/2$. By assumption, $\frac{\partial X^*}{\partial I^*} > 0$. Hence $A > 0$. We thus obtain

Proposition E2: $\text{Sign} \left(\frac{\partial \text{RRD}}{\partial I^*} \right) = \text{Sign} \left(\frac{\partial X^*}{\partial I^*} \right) > 0$.

While in Proposition B5 we obtained an ambiguous result, here it is clear that $\text{Sign} \left(\frac{\partial \text{RRD}}{\partial I^*} \right) > 0$. That is, the extent of relative rent dissipation, like the

contestants' outlays, is positively related to the proposed price. The reason for this is that if the regulator sets a higher price, this increases the prize for winning the contest for both contestants. Hence, contest efforts go up, $\frac{\partial X^*}{\partial I^*} > 0$. Secondly, such an increase in price reduces the sum of the producer and consumer rents in the event that the high-price outcome is realized (and leaves the consumer and producer rents in the status-quo price unchanged). Hence, for unchanged winning probabilities the result is immediate. However, one also has to take into consideration that the equilibrium probabilities of the proposal being approved or rejected and, in turn, the expected welfare change. This change is given by:

$$\begin{aligned} & \frac{\partial \left(\bar{E}(w_c^*) + \bar{E}(w_f^*) \right)}{\partial I^*} \\ &= \frac{\partial \text{Pr}_c^*}{\partial I^*} n_c^* + \frac{\partial n_c^*}{\partial I^*} \text{Pr}_c^* + \frac{\partial (C + D)}{\partial I^*} + \frac{\partial \text{Pr}_f^*}{\partial I^*} n_f^* + \frac{\partial n_f^*}{\partial I^*} \text{Pr}_f^* + \frac{\partial G}{\partial I^*} \end{aligned}$$

and, by the above corollary, we are assured that it is either negative or lower than the change in X^* .

Finally, we study the effect of a change in the political culture that is represented by α on the extent of relative rent dissipation (RRD). Since,

$$\left(\frac{\partial (\text{RRD})}{\partial \alpha} \right) = \left(\frac{\partial I^*}{\partial \alpha} \frac{\partial (\text{RD})}{\partial I^*} \right) = \left(\frac{\partial I^*}{\partial \alpha} \right) \left(\frac{\partial X^*}{\partial I^*} \right),$$

by Propositions E1 and E2 (see also Proposition B5) we get

Corollary E1: $\frac{\partial \text{RRD}}{\partial \alpha} < 0$.

That is, the extent of rent dissipation is inversely related to α . A more politicized government (a lower α) results in increased rent dissipation (reduced expected payoff per unit of investment of the contestants).

5 Welfare Analysis

In the existing literature on the monopoly rent-seeking rent-avoidance game, the price that the monopoly can charge is assumed to be equal to the profit-maximizing monopoly price, P_m . The alternative price is assumed to be the competitive price P_{mc} and the analysis is chiefly concerned with the effect of introducing consumers' surplus-defending activities on the social cost of the monopoly. In the standard monopoly case with no consumer opposition and with no producers' contest on the monopoly's rent corresponding to the price I , the social cost of the monopoly is represented by $\text{DWL}_c = B + E = n_c - n_f$ (see Fig. E.1). In our reference case, where a single producer competes against a single representative of the consumers on the approval or rejection of the proposed monopoly price I , the expected social cost of the monopoly is equal to the sum of the expected deadweight loss and the contestants'

aggregate equilibrium outlays. The social cost of monopoly is given by

$$DWL_u = \frac{n_f}{n_f + n_c} (n_c - n_f) + \frac{n_f n_c}{n_f + n_c}. \quad (E.14)$$

Consumers' opposition reduces the social costs of monopoly if

$$DWL_u < DWL_c \Leftrightarrow n_f < n_c - n_f. \quad (E.15)$$

That is, if the benefit of the monopoly, n_f , is smaller than the deadweight loss $B + E = n_c - n_f$. This is a special case of the condition that has been established by Baik (1999), Ellingsen (1991) and Schmidt (1992) who studied the case of monopoly rent-seeking and rent-avoidance in a model with many consumers and many producers.

In this subsection we are not concerned with the effect of consumers' opposition on the aggregate expected welfare, but rather with the effect of a change in the endogenously determined monopoly price and with the effect of a change in the political culture on the expected aggregate welfare. The expected social payoff in equilibrium is given by¹⁰³

$$\begin{aligned} E(U^*) &= \bar{E}(w_c^*) + \bar{E}(w_f^*) - X^* = E(w_c^*) + E(w_f^*) \\ &= (A(I) + B(I) + C(I) + D(I) + E(I) + G(I)) - \Pr_f(B(I) + E(I)) - X^*. \end{aligned} \quad (E.16)$$

The sum $A(I) + B(I) + C(I) + D(I) + G(I) + E(I)$ is independent of the price I . Therefore, maximization of the expected social welfare is equivalent to the minimization of the sum of the expected deadweight loss associated with the monopoly and the total rent-seeking rent-avoidance outlays, $\Pr_f(B(I) + E(I)) + X^*$.

$$\frac{\partial E(U^*)}{\partial I} = \frac{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*))}{\partial I} - \frac{\partial X^*}{\partial I}. \quad (E.17)$$

From Eq. (E.11) we get that

$$\begin{aligned} \frac{\partial E(U^*)}{\partial I} &= -\frac{(1-2\alpha)}{\alpha} \frac{1}{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*)) / \partial X^*} \frac{\partial X^*}{\partial I} - \beta \frac{\partial X^*}{\partial I} \quad (E.18a) \\ &= -\frac{\partial X^*}{\partial I} \left[\frac{1-2\alpha}{\alpha} \frac{1}{\partial (\bar{E}(w_c^*) + \bar{E}(w_f^*)) / \partial X^*} \right]. \end{aligned}$$

¹⁰³ Assuming, alternatively, that β ($0 \leq \beta \leq 1$) of the rent-seeking rent-avoidance outlays are wasted resources and that the regulator's payoff is also part of the welfare: $E(U) = \bar{E}(w_c^*) + \bar{E}(w_f^*) + G(\cdot) - \beta X^*$ would not alter the results because, by assumption, at the price set by the regulator, the price that maximizes $G(\cdot)$, $\frac{\partial G}{\partial I^*} = 0$.

Recall that Eq. (E.11) characterizes an interior solution of the regulator's problem. Such a solution is obtained when $\alpha < 1/2$. For $\alpha \geq 1/2$, the equilibrium price is P_{mc} . An increase in the proposed price relative to P_{mc} reduces the expected gross aggregate payoff and increases the zero rent-seeking outlays. Hence, from Eq. (E.17), $\left. \frac{\partial E(U^*)}{\partial I} \right|_{I=P_{mc}} < 0$. This implies that for $\alpha \geq 1/2$ and, by Eq. (E.18a) also for $0 \leq \alpha < 1/2$, the effect of a change in the proposed price I on the aggregate expected welfare is equal to the inverse of its effect on the total outlays of the contestants. Hence,

Proposition E3: $\frac{\partial E(U^*)}{\partial I^*} < 0$.

That is, the expected social welfare is inversely related to the proposed monopoly price.

Proposition E3 clarifies the significance of the effect of a change in the proposed price I on the equilibrium rent-seeking rent-avoidance outlays in determining the effect of a change in the proposed price on the expected social welfare. An increase (decrease) in the contestants' outlays implies a decrease (increase) in the expected social welfare.

The effect of a change in the parameter α that represents the political culture on the expected social welfare is $\frac{\partial E(U^*)}{\partial \alpha} = \frac{\partial E(U^*)}{\partial I^*} \frac{\partial I^*}{\partial \alpha}$. Hence, by Propositions E1 and E3,

Corollary E2: $\frac{\partial E(U^*)}{\partial \alpha} > 0$.

That is, the expected social welfare is positively related to the parameter α . In particular, a higher degree of politicization (an increase in $(1 - \alpha)$) decreases the expected social welfare.

6 When Does The Calf (Monopoly) Wish to Suck Less than the Cow (Regulator) Desire to Suckle?

We argue that it may well be the case that both the consumers and the producer prefer a price lower than that proposed by the bureaucrat. Such is the case when the bureaucrat proposes the standard profit-maximizing monopoly price. In such a situation the bureaucrat's proposal reflects his own interest, however, it may seem that he is more concerned than the potential monopoly about the enhancement of the latter's interest. In any event, in such a case more than the calf (potential monopoly) wishes to suck does the cow (regulator) desire to suckle. Moreover, if the proposed equilibrium price is approved, it is also ex-post implemented.

Notice that the consumers prefer that the price will be as low as possible and thus, given the market constraint their preferred price is P_{mc} . The positive price $I = P^*$ that maximizes the firm's expected payoff $E(u_f^*)$ is

characterized by the following first-order condition:

$$\begin{aligned} \frac{\partial E(u_f^*)}{\partial P} &= \frac{3(n_f(P))^2(n_c(P) + n_f(P))^2 \frac{\partial n_f(P)}{\partial P}}{(n_c(P) + n_f(P))^4} \\ &- \frac{2(n_f(P))^3(n_c(P) + n_f(P))(\frac{\partial n_f(P)}{\partial P} + \frac{\partial n_c(P)}{\partial P})}{(n_c(P) + n_f(P))^4} = 0. \end{aligned} \quad (\text{E.18b})$$

At the profit-maximizing monopoly price, P_m , $\frac{\partial n_f(P)}{\partial P} = 0$. Since $\frac{\partial n_c(P)}{\partial P} > 0$, at P_m , $\left. \frac{\partial E(u_f^*)}{\partial P} \right|_{P=P_m} < 0$. This implies that the price that maximizes the producer's expected net payoff is smaller than the profit-maximizing monopoly price. To sum up,

Lemma E1: $P^* < P_m$.

In light of Lemma E1 we argue that a producer who competes for a monopoly status would not lobby for the profit-maximizing monopoly price P_m , but rather for his optimal price P^* , the price that maximizes his expected net payoff. The reason for this is that the producer realizes that lowering the price to P^* decreases his payoff from winning the contest. But it also decreases the consumers stake and, in turn, their lobbying efforts. The producer prefers P^* because the resulting favorable increase in the producer's probability of winning the contest dominates the former unfavorable effect.

The effect of a change in the proposed monopoly price I on the total contestants' outlays is given by

$$\frac{\partial X^*}{\partial I} = \frac{n_f(I)n_c(I)n'_f(I)}{(n_c(I) + n_f(I))^2} \left(\frac{\eta_c}{\eta_f} + \frac{n_c(I)}{n_f(I)} \right), \quad (\text{E.19})$$

where $\eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j} = n'_j \frac{I}{n_j}$ is the elasticity of player j 's stake with respect to a change in the proposed price I . We therefore obtain

Lemma E2: For any price I , $P_m > I > P_{mc}$, $\frac{\partial X^*}{\partial I} > 0$.

That is, the total rent-seeking rent-avoidance outlays increase with an increase in the price set by the bureaucrat.

Now the bureaucrat selects his strategy, that is, the proposed price I subject to the political constraint imposed by the ruling politician, namely, subject to the contest on the approval of the proposed price. His objective function $G()$ is of the general form

$$G(E(u_c); E(u_f); (x_c + x_f)), \quad (\text{E.20})$$

where $E(u_c)$ and $E(u_f)$ are the expected net payoffs of the consumers and the producer. The contestants' outlays ($x_f + x_c$) represent either transfers to the government (the ruling politician and/or the regulator) or resources wasted in the contest. Note that the dependence on the public interest is consistent with the politician being either benevolent or realistic (wishing to be re-elected).

The first-order condition for the maximization of $G(\cdot)$ with respect to I is satisfied if:

$$\frac{\partial G(\cdot)}{\partial E(u_c^*)} \frac{\partial E(u_c^*)}{\partial I} + \frac{\partial G(\cdot)}{\partial E(u_f^*)} \frac{\partial E(u_f^*)}{\partial I} + \frac{\partial G(\cdot)}{\partial X^*} \frac{\partial X^*}{\partial I} = 0. \quad (\text{E.21})$$

Note that at P^* , $\left. \frac{\partial E(u_f)}{\partial I} \right|_{P^*=I} = 0$. Therefore, from Eq. (E.21), $I^* > P^*$ if

$$\frac{\partial G / \partial X|_{I=P}}{\partial G / E(u_c)|_{I=P}} > - \frac{\partial E(u_c) / \partial I|_{I=P^*}}{\partial X / \partial I|_{I=P^*}}. \quad (\text{E.22})$$

Since the RHS of Eq. (E.20) is independent of $G(\cdot)$, we obtain

Proposition E4: $I^* > P^*$, provided that the sensitivity of $G(\cdot)$ with respect to X relative to its sensitivity with respect to $E(u_c)$ is sufficiently large.

Note that $\partial X / \partial I|_{I=P^*} > 0$ and $\partial E(u_c) / \partial I|_{I=P^*} < 0$. Therefore if $\partial G / E(u_c)|_{I=P} > 0$, then in order for Eq. (E.22) to hold, it must be that $\partial G / \partial X|_{I=P} > 0$.

The Proposition states that the marginal effect on G of a change in the contestants' expenditures must be positive and sufficiently high relative to the effect that a change in the consumers' expected utility has on G . In other words, an increase in the price I has two conflicting effects on G . It increases G via the increase in the contestants' rent-seeking rent-avoidance expenditures, X , but it decreases G via the decrease in the expected payoff of the consumers. The condition stated in the Proposition requires that the relative change in G due to a change in the contestants' efforts is sufficiently high.

Under such circumstances the producer prefers the price P^* and the consumers prefer P_{mc} to the equilibrium price I^* proposed by the bureaucrat. It is clear that if the proposed price I^* , $I^* > P^*$, is the ex-post outcome of the contest, namely, I^* is proposed by the bureaucrat and is approved by the politician, then the firm voluntarily charges this price because ex-post it is its best price. In other words, ex-post I^* is fully implemented. Relating to the proposed price I^* and the firm's optimal price P^* as direct measures of the extent of permissible and desired consumers' surplus extraction, under the condition stated in the Proposition one obtains that indeed more than the calf (the potential monopoly) wishes to suck does the cow (bureaucrat) desire to suckle.

The revealed preference of the bureaucrat may offer a direct test for the condition stated above; Whenever the proposed monopoly price I^* is the

standard profit-maximizing monopoly price P_m , by the Lemma E1 $P^* < I^*$. This implies that the sensitivity of the bureaucrat's objective function to the contestants' expenditures is positive and sufficiently high relative to its sensitivity with respect to the expected utility of the consumers.

To illustrate the situation in Proposition E4, let us consider two examples: in the first one the bureaucrat wishes to maximize total lobbying outlays, that is, $G(E(u_c^*); E(u_f^*); X^*) = X^*$. In such a case the contestants' outlays are apparently transfers to the government and the bureaucrat is only concerned with their maximization. In the second less extreme and more general example,

$$G(.) = \alpha g \left(\sum_i \text{Pr}_i^* n_i(I) \right) + (1 - 2\alpha) f(x_c^* + x_f^*), \quad (\text{E.23})$$

where $E(u_i^*) - x_i^* = \text{Pr}_i^* n_i(I) \quad \forall i = 1, 2$ represents the expected payoff of interest group i . The parameters α and $(1 - 2\alpha)$ are the weights assigned to the components corresponding to the expected social welfare and the contestants' outlays. The weight $(1 - 2\alpha)$ can be negative or positive. A negative weight implies that the contestants' outlays are considered as wasteful resources. g and f are monotone increasing functions that specify the welfare components corresponding to the expected payoff of the public and to the total rent-seeking rent-avoidance expenditures. The regulator's mixed commitments to the public and to the ruling politician are thus represented by α . This parameter can be interpreted as one representing the political culture of the government. Notice that α may also reflect the commitment of the regulator to the public interest, to the ruling politician and to his narrow interest of collecting the contestants' outlays transferred to him. In this second example the necessary condition in the Proposition takes the form: $0 \leq \alpha < 1/2$ (the first example is clearly the special case where $\alpha = 0$).

7 A Numerical Example

The following example illustrates some of the results presented above. Suppose that the demand function is linear and the marginal cost is constant and equal to zero. That is, $P = 1 - q$ and $mc = 0$. Let $f(y) = g(y) = y$.

Under these assumptions,

$$\begin{aligned} A(I) &= (1 - I)I, B(I) = I^2/2. \\ C(I) + D(I) &= (1 - I)^2/2, A(I) + B(I) + C(I) + D(I) = 0.5, \\ G(I) &= E(I) = 0, P_{mc} = 0 \quad \text{and} \quad P_m = 0.5. \end{aligned}$$

Moreover, assume that the objective of the government equals

$$G(.) = \alpha (E(w_c^*) + E(w_f^*)) + (1 - \alpha) (x_c^* + x_f^*).$$

Table E.1. Political culture, α , equilibrium monopoly price, I^* , the producer's rent-seeking outlays, x_f^* , winning probability, Pr_f^* and expected net payoff $E(w_f^*)$, the consumer's rent-avoidance outlays, x_c^* , and expected net payoff, $E(w_c^*)$, total rent-seeking rent-avoidance outlays, X^* , and expected social welfare, $E(U^*) = \bar{E}(w_c^*) + \bar{E}(w_f^*) - X^*$

α	I^*	Pr_f^*	x_f^*	x_c^*	X^*	$E(w_f^*)$	$E(w_c^*)$	$E(U^*)$
0.0000	0.5754	0.3735	0.0572	0.0959	0.1531	0.0341	0.2510	0.2851
0.1000	0.5579	0.3801	0.0581	0.0948	0.1529	0.0356	0.2523	0.2879
0.2000	0.5264	0.3923	0.0594	0.0924	0.1518	0.0382	0.2559	0.2941
0.2500	0.5000	0.4000	0.0600	0.0900	0.1500	0.0400	0.2600	0.3000
0.3333	0.4231	0.4225	0.0596	0.0814	0.1410	0.0436	0.2777	0.3213
0.3845	0.3398	0.4430	0.0554	0.0696	0.1250	0.0440	0.3054	0.3494
0.4500	0.1760	0.4746	0.0362	0.0400	0.0762	0.0327	0.3838	0.4165
0.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000

The Stackelberg–Nash equilibria (x_c^*, x_f^*, I^*) of our game of monopoly regulation are calculated for eight values of the parameter α . Table E.1 presents these equilibria together with the corresponding winning probabilities of the contestants, their rent-seeking rent-avoidance outlays and their net payoffs.

Comparison of x_c^* and x_f^* reveals that for any α the consumers' rent-avoidance efforts are larger than the producer's rent-seeking efforts. In a similar way one can verify that Table E.1 is consistent with all other results.

If $\alpha = 0.25$, the regulator proposes a price that is equal to the profit-maximizing monopoly price, $I^*(0.25) = P_m = 0.5$. For $\alpha = 0.25$, $I^*(\alpha) > P_m$. If $\alpha = 1/2$, the proposed price is equal to $P_{mc} = 0$. The optimal price from the producer's viewpoint is $P_0 = 0.3398 < 0.5 = P_m$. The political culture that gives rise to this price is represented by $\alpha = 0.3845$. The potential monopoly prefers therefore that the government assigns the positive weight 0.3845 to the social welfare rather than any other lower or higher weight.

The certain social welfare under the competitive price $P_{mc} = 0$ is equal to 0.5. In the standard monopoly case, where $P_m = 0.5$ and there are no consumer-surplus defending activities, social welfare is equal to $0.5 - 0.125 = 0.375$. In our extended game of monopoly regulation, if the political culture gives rise to $P_m = 0.5$, the expected social welfare is equal to 0.300. The contest on the approval or rejection of the proposed profit-maximizing monopoly price, $P_m = 0.5$, thus reduces social welfare relative to the standard monopoly case. Finally, notice that in the standard monopoly case with no consumer opposition to the monopoly's rents, the monopoly's certain payoff (profit) is equal to 0.25. When the proposed price is P_m

Table E.2. Political culture, α , equilibrium monopoly price, I^* , deadweight loss under uncertainty (with a contest), $DWL_u = 0.5 - E(U^*)$, and deadweight loss under certainty, DWL_c (without a contest)

α	I^*	$DWL_u = 0.5 - E(U^*)$	DWL_c
0.0000	0.5754	0.2149	0.1656
0.1000	0.5579	0.2121	0.1556
0.2000	0.5264	0.2059	0.1386
0.2500	0.5000	0.2000	0.1250
0.3333	0.4231	0.1787	0.0895
0.3845	0.3398	0.1506	0.0577
0.4500	0.1760	0.0835	0.0139
0.5000	0.0000	0.0000	0.0000

$= 0.5$ and consumers defend their surplus under the competitive price $P_{mc} = 0$, the expected net payoff of the producer is reduced to 0.04. From the producer's viewpoint the optimal price is $P_0 = 0.3398 < 0.5 = P_m$. This proposed price secures him the maximal expected net payoff of 0.044, which is still lower than 0.25. That is, the producer prefers that the proposed monopoly price be lower than P_m , but he prefers even more a certain price of P_m over the uncertain price P_0 .

Table E.2 compares DWL_c , the deadweight loss under certainty, that is under the standard monopoly case with no consumer opposition to the monopoly price, with $DWL_u = E(U^*)$, the expected deadweight loss in our extended game of monopoly regulation. Under an equilibrium monopoly price that arises in political cultures represented by α , $0 \leq \alpha < 0.5$, $DWL_c < DWL_u$. That is, the social cost of monopoly increases when consumers defend their surplus under the competitive price $P_{mc} = 0$. In particular, under the profit-maximizing monopoly price $P_m = 0.5$, $DWL_c = 0.125 < 0.200 = DWL_u$. Finally note that if the political culture is represented by $\alpha = 0.45$, the proposed monopoly price in equilibrium is 0.176 and the expected social cost of monopoly is equal to 0.0895. In such a case the social cost of monopoly is reduced relative to the standard monopoly case where the certain price is $P_m = 0.5$ and the certain deadweight loss is equal to 0.125.

8 Remark on the Alternative Interpretation

Our model has an alternative interpretation that can clarify the roles played by regulators, incumbent politicians, potential monopolies and consumers on the endogenous determination of monopoly price. As in Chapter IV, the reg-

ulator/bureaucrat can be conceived as a professional *civil servant* who works out policy proposals. The ruling politicians have to decide whether to accept or reject the proposed policy. Since the politicians lack information regarding the costs and benefits of the proposal, they can be “persuaded” by the interest groups to vote in favor or against a specific policy. Their decision is uncertain, depending on the lobbying efforts made by the interest groups. Again, the latter may consist of direct transfers or of the wasteful lobbying efforts associated with information transmission by the interest groups. In such a case the regulator and the interest groups consider the outcome of the lobbying contest to be uncertain.

Now there are four players instead of the three presented above. The fourth player is the politician who approves or rejects the regulator’s proposed price. We have referred to this player who is not modeled as a rational player as the ruling politician. The ruling politician is aware of the direct potential benefit of the contest between the interest groups, namely, of the possibility to collect part or all of the rent-seeking rent-avoidance outlays incurred by the two contestants. He may also be aware of the effect of his decision on his probability of being re-elected either via the expected campaign contributions of the contestants (the contestants’ outlays) or via the expected support of the voters whose welfare depends on the regulation policy of the government. The bureaucrat considers the rent-seeking rent-avoidance contest as a political constraint. His action is motivated by commitment to the ruling politician, to the public or to his narrow self-interest.

Although the ruling politician is not modeled as a rational player, he affects the outcome of the contest by creating it and, in particular, by being responsible for the existence of the specific CSF that characterizes the contest. As already noted, the uncertainty might be due to lack of information regarding the data relevant to the implementation of the proposed policy. Note that although the politician’s behavior is not modeled and he is just posited to respond to the pressure of the interest groups, the politician’s preferences that may clearly depend on the proposed price usually affect the policy selected by the bureaucrat. This is due to the fact that the bureaucrat’s objective function partly reflects the politician’s preferences.

The ruling politician may initiate the regulation and issue guidelines that affect the form of the feasible policy domain $(\underline{I}, \bar{I})$. Indirectly, his preferences also take part in the determination of the proposed policy because, at least to some extent, they are reflected in the objective function of the bureaucrat who is the actual third layer in the game. When preparing his proposal he takes into account the rent-seeking contest between the producer and the consumers that, from his point of view, is a political constraint. His action is affected by his commitments to the ruling politician and to the public interest. These commitments are represented by his specific objective function that may allow complete independence of the ruling politician (complete dedication to the enhancement of social welfare), complete dependence on the ruling politician and intermediate cases of mixed commitments to the ruling politician and to

the public interest. The ruling politician may benefit from the rent-seeking rent-avoidance outlays that correspond to the proposed monopoly price that determines the payoffs of the consumers and the producer, because part or all of the outlays constitute a transfer of resources to him. A more complex description of the objective function of the bureaucrat v would be as follows: the politicians assigns a weight of a to the expected welfare and $(1 - a)$ to the contestants' outlays:

$$v = a (E(w_c^*) + E(w_f^*)) + (1 - a) (x_c^* + x_f^*) .$$

The bureaucrat assigns a weight of b to the politician's preferences and $(1 - b)$ to the expected social welfare:

$$G = bv + (1 - b) (E(w_c^*) + E(w_f^*)) .$$

We therefore obtain that

$$G = \alpha (\bar{E}(w_c^*) + \bar{E}(w_f^*)) + (1 - 2\alpha) (x_c^* + x_f^*) ,$$

where $\alpha = (1 - b + ba)$. Changes in the weight assigned by the bureaucrat and the politicians are reflected in changes in a and b . Changes in these weights affect α . Changes in α have been analyzed in the previous section.

9 Summary

In our uncertain environment in which consumers defend their surplus, a potential monopoly may end up charging the status-quo competitive price or some higher price. Furthermore, a potential monopoly, even if granted a monopoly status, may charge different prices, dependent on the political culture of the environment. Our results highlight the significance of the political culture of the government (the bureaucrats and the ruling politicians) in the endogenous determination of monopoly regulation via price control. We examine, in particular, the relationship between the parameter that represents political culture (the degree of politicization of the government) and the rent-seeking rent-avoidance efforts of the interest groups affected by the proposed monopoly price, their probability of winning the contest on the approval of the proposed policy and their aggregate expected benefit. Our results can rationalize some of the empirical findings regarding price regulation in alternative political economic environments, e.g., electricity price regulation in different states where bureaucrats are appointed or elected, Paul and Schoening (1991).

In our extended strategic setting where the bureaucrat is a leading player who sets the monopoly price subject to the political constraint (the rent-seeking rent-avoidance contest on the approval of his proposed monopoly price), the equilibrium monopoly price usually differs from the standard profit-maximizing monopoly price. In fact, any observed regulatory decision corresponds to some particular political culture.

In developing our analytical framework, we made some simplifying assumptions that enabled us, first, to focus on the new elements of our extended political economic game of monopoly regulation and, second, to derive results making a relatively modest analytical effort. We conclude with a brief discussion of some possible extensions of our proposed model. In our model there is a single producer who is the potential monopoly. In a more complete theory competition among n producers on the potential monopoly status could be introduced. Such a generalization would tend to reduce the rent-seeking activities of the producers who face not only the opposing consumers, but also the competition of other producers. The assumption of a single representative consumer could also be replaced. Monopoly rent-avoidance, that is, protection of consumers' surplus is a public good. Assuming m consumers introduces free-riding incentives that may considerably lower the rent-avoidance activities of the consumers. Both of these generalizations could be introduced by adding another stage to our game as in Baik (1999), Ellingsen (1991), Katz and Tokatlidu (1996), Nitzan (1991) and Schmidt (1992).

In the contest on the approval of the proposed monopoly price, the players are asymmetric since their stakes are different. Additional asymmetry could be introduced by assuming that the producer and the representative of the consumers differ in their degrees of risk aversion or in their lobbying capabilities as in Baik (1994b), Gradstein (1994), Hillman and Riley (1989), Konrad and Schlesinger (1997).

The contest success function (CSF) in the competition on the approval of the proposed monopoly price is the most commonly studied special case of Tullock's (1980) family of contest success functions. Alternative assumptions could be made regarding the form of the CSF. In particular, our analysis can be extended by assuming that the CSF is of Tullock's general form, as in Baye, Kovenock and de Vries (1993), Che and Gale (1997), (1998), of the more general logit form, as in Baik and Shogren (1992), Dixit (1987), Gradstein (1994), Rosen (1986), Snyder (1989) or of the difference form, as in Baik (1998), Hirshleifer (1989) and Skaperdas (1996).

Some other possible interesting generalizations that are beyond the scope of the present study are:

1. assuming a more general, nonlinear, objective function for the regulator,
2. allowing a more complex regulation policy that consists of monopoly price as well as monopoly tax or some form of compensation transferred from the monopoly to the consumers,
3. endogenizing the parameter that represents the political culture of the government.

Finally, we have also shown that in a political economic game of monopoly regulation where price is determined by the government (a bureaucrat who proposes the price and a ruling politician who approves or rejects the proposal), it is possible that the price proposed by the bureaucrat is higher than the price the firm would have preferred that the bureaucrat proposed. In such

a case the bureaucrat is concerned about the enhancement of his own interest, but based on the comparison between his proposed price and the potential monopoly's optimal price, it may seem that he cares about the interest of the producer more than the latter does. The existence of such a situation depends on the objective function of the bureaucrat. Specifically, it requires that the sensitivity of his objective function to the contestants' expenditures is positive and sufficiently high relative to its sensitivity with respect to the expected utility of the consumers. Note that if the bureaucrat proposes the standard profit-maximizing monopoly price, which is supposedly his optimal price, then we can be sure that this condition is satisfied because the potential monopoly always prefers a lower price.

XIII

Privatization

The literature on privatization focuses mainly on facts and empirical data that shed light on the reasons why various governments undertook privatization, the effects of privatization, the extent of its success, and the possible reasons for the failure of different privatization methods.¹⁰⁴ This chapter does not deal with these aspects, but rather with the political struggle among the various interest groups involved in privatization. Chronologically, privatization can be divided into two stages. The first stage involves the government's decision to privatize and therefore the political struggle among the interest groups that try to affect this decision. The second stage is devoted to the implementation of the decision.¹⁰⁵ Focusing on the former stage, we study a political game where two interest groups, an outside investor and the employees of the publicly owned company, make efforts to affect the politicians with the aim of gaining the privatization rents. Note, however, that when a proposal for privatization is submitted to the politicians, it takes into account how it can be implemented in the second stage of the privatization process.

To date, a comprehensive theory describing the political struggle among the interest groups affected by privatization has not been proposed.¹⁰⁶ This political struggle is important because it affects the probability of privatization and because it clarifies the effect of the nature of the proposed privatization on the likelihood of its implementation. In other words, our motivation to develop an economic theory that focuses on the first stage of the privatization process is due not only to the need to understand the nature of the struggle between the involved interest groups and its effect on the privatization decision, but also the need to justify the selected mode of privatization or, alternatively,

¹⁰⁴ Bos and Nett (1991); Boycko et al. (1994, 1996); Cantor (1996); Hillman (1992); Laffont and Tirole (1992) and Megginson, et al. (1994).

¹⁰⁵ On the implementation of privatization, see Gal and Yaari (2001) and Bos (2000).

¹⁰⁶ For examples of earlier studies relating to the political aspects of privatization, see Bos and Harms (1997) and Perotti (1995). This literature is not concerned, however, with the political struggle that precedes a final decision on privatization.

expose the reasons for the failure of some of the undertaken privatization methods.

The endogenous variable that represents the government involvement in our game of privatization is the sale price of the privatized company. An important parameter that affects the sale price and the probability of privatization is the compensation paid by the outside investor to the employees of the privatized company. The main objectives of the analysis are to determine the effect of the nature of the government (the weight it assigns to social welfare relative to the rent-seeking efforts of the interest groups) and the effect of a budgetary constraint on the lobbying of the employees on the sale price of the company and on the probability of privatization.

1 The Model

a An Overview

In the proposed political economic game of privatization there are three players: the government, an outside investor who wishes to buy the firm, and the employees who oppose the privatization of the publicly owned firm.¹⁰⁷ While the investor wishes to purchase the company, the employees, represented by the unions,¹⁰⁸ oppose the sale in order to protect their jobs or to acquire the company themselves. The government consists of two components: a privatizing authority that represents professional civil servants who take into account the public well being, and the interest of the politicians who are typically concerned with their own self-interest. The privatizing authority sets a privatization proposal that is presented to the politicians who approve or reject it. Given the proposal, the interest groups, the workers, and the outside buyer lobby the politicians in order to increase the probability that their preferred outcome (rejection or approval of the proposal) is realized. Ex-post, the employees win the contest if the company is not privatized, and the investor wins the contest if the firm is privatized.

Being aware of this political reality, namely, the existence of the lobbying contest between the interest groups that implies uncertainty regarding the approval of the privatization proposal, the privatization authority selects a proposal that maximizes the expected welfare of the interest groups or, more generally, a weighted sum of the expected welfare and of the lobbying efforts of the interest groups.¹⁰⁹ As in Chapters IV and XI, the politicians do not

¹⁰⁷ Entry into the competition by other players is not allowed (see Gradstein, 1995).

¹⁰⁸ Although the employees are considered as an interest group, they are assumed to act as a single economic agent that can be considered as a representative who works to further their interests. The free-riding problem is thus disregarded.

¹⁰⁹ Such a more general and less extreme objective function is assumed in Grossman and Helpman (1994, 1995).

participate directly in the game. However, they influence its outcome by being responsible for the existence of the contest between the interest groups, namely, the uncertainty regarding the fate of the proposal submitted by the privatization authority.

The strategy of the privatizing authority is the sale price of the government company. The strategies of the interest groups are their lobbying efforts. Hence, in the second stage of the privatization game, the employees, player 1, and the investor, player 2, simultaneously determine their strategies in the game in which the sale price for the company, P , and the exogenous compensation, C , are given. In the first stage, the privatizing authority, the leading player in the game, sets the sale price for the company, taking into account the equilibrium in the simultaneous subgame played between the employees and the investor.

The simultaneous lobbying contest between the interest groups is assumed to be resolved by the simple lottery contest success function. Note that in the privatization game the payoffs of the two interest groups are not symmetric. The privatizing authorities are often prepared to negotiate and grant the employees various benefits to overcome their resistance. Alternatively, in order to increase his chances of winning the competition, the investor has an incentive to commit himself-ahead of time to compensate the employees if he wins the contest. Thus, if the investor wins the competition, according to the contract previously concluded with the government, he is bound to compensate the employees. Including this compensation in the model introduces the asymmetry between the chances of the two interest groups. This enables the examination of the relationship between the direct compensation to the employees by the potential investor and the probability of privatization.

b The Subgame Between the Employees and the Investor

Let us denote by V_1 the value assigned by the employees to the nonprivatized company. The value of the privatized company from the employees' viewpoint is denoted by V . These values reflect the employees' assessment of any relevant aspect of the two "alternative" companies, namely, the privatized and the nonprivatized company. These aspects include future wages and the probability of being employed in the firm under the two possible situations. The difference between V_1 and V , $V'_1 = V_1 - V$, determines the cost of the employees from privatization. Alternatively, this difference can be interpreted as the internal rent capture gained by avoiding public ownership of the company. In other words, the employees are worse off by $V'_1 = V_1 - V$ if there is, for example, internal rent capture before public ownership is abandoned. V_2 denotes the company value to the investor after privatization. The value of V_2 is, of course, a key variable when the investor makes his decision on whether and on how much to lobby for the purchasing of the firm. P denotes the company sale price set by the government. The net payoff to the investor from privatization is therefore equal to $V'_2 = V_2 - P$. The value of the firm to the government

before privatization is denoted by V_G . According to Megginson et al. (1994) and Shleifer and Vishny (1994), a government company is less efficient than a private one and thus has a lower value. Pint (1991), however, suggests that an over-manned state-owned company is not necessarily less efficient than after privatization if the latter means excessive capital intensity.¹¹⁰ We, nevertheless, assume that the investor's valuation of the firm after privatization is higher than that of the government, that is, $V_2 > V_G$.¹¹¹ We also assume that his valuation is higher than the workers' valuation of the firm before privatization, that is, $V_2 > V_1$. One possible reason for this could be that the investor has the opportunity to capture more rents than the workers because under his control the company is less vulnerable to inefficiency due to free riding.

The investor may decide to compensate the employees when privatizing the company. The main idea behind this compensation is to decrease the employees' opposition to the privatization. Let C denote the direct compensation to the employees. At this stage we assume that the compensation level is given exogenously. Later, we discuss the situation where the level of compensation is endogenous. This compensation is paid by the investor if he wins the competition. The compensation payments are therefore not a wasted resource and are based on the sale contract between the investor and the government.

The probabilities of rejection and approval of the privatization proposal are Pr_1 and Pr_2 and are given by the Tullock's (1980) simple lottery contest success function.

Let π_1 denote the employees' (the first player's) expected utility and π_2 the investor's (the second player's) expected utility. The payoff functions of the two players are

$$\pi_1 = \text{Pr}_1 V_1 + \text{Pr}_2 (C + V) - x_1 = (C + V) + \text{Pr}_1 (V'_1 - C) - x_1, \quad (\text{E.24})$$

and

$$\pi_2 = \text{Pr}_2 (V_2 - C - P) - x_2 = \text{Pr}_2 (V'_2 - C) - x_2. \quad (\text{E.25})$$

The total resources invested in rent-seeking, $te = x_1 + x_2$ and the corresponding probability of privatization are given by

Lemma E3:

$$x_1^* = \frac{(V'_2 - C)(V'_1 - C)^2}{(-2C + V'_1 + V'_2)^2}, \quad x_2^* = \frac{(V'_2 - C)^2(V'_1 - C)}{(-2C + V'_1 + V'_2)^2},$$

$$te^* = \frac{(-C + V'_2)(-C + V'_1)}{-2C + V'_1 + V'_2} \quad \text{and} \quad \text{Pr}_2^* = \frac{-C + V'_2}{-2C + V'_1 + V'_2}.$$

¹¹⁰ Indeed, Martin and Parker (1997) do not find evidence for a general improvement in total factor productivity; see also Willner (2001).

¹¹¹ It turns out that in our setting a technically and socially efficient public enterprise would not be privatized. The analysis therefore focuses on privatization that is potentially efficiency enhancing.

$\Pr_1^* > 0$ and $\Pr_2^* > 0$, only if $C < V'_1$ and $C < V'_2$; otherwise the equilibrium is not interior, that is, one of the players wins with certainty. If $V'_1 < V'_2$ ($V'_1 > V'_2$), the net utility to the investor of implementing privatization is higher (lower) than the net utility to the employees of not carrying out the privatization. Thus, the investor would invest more (less) to acquire the company via rent-seeking resources so that $x_1^* < x_2^*$ ($x_1^* > x_2^*$). In turn, this would increase his (their) probability of winning the game, and the chances of the investor (the employees) would be greater than those of the employees (the investor): $\Pr_1^* < \Pr_2^*$ ($\Pr_1^* > \Pr_2^*$).

2 The Optimal Level of Compensation

Let us now consider the case where the investor determines the optimal level of compensation C . The effect of a change in the compensation payment C on the investor's expected utility, see Eq. (E.23), determines whether it is worthwhile complying with the government's proposed contract, including the requirement to pay compensation. Using Eqs. (E.22) and (E.23) and Lemma E3, in equilibrium the payoff of the investor is given by

$$\pi_2 = \frac{(V'_2 - C)^3}{(-2C + V'_1 + V'_2)^2}.$$

Hence,

$$\frac{\partial \pi_2}{\partial C} = \frac{(V_2 - P - C)^2 (2C - P + 3V - 3V_1 + V_2)}{(-2C - P - V + V_1 + V_2)^3}.$$

By assumption, the denominator of the expression is positive. However, the sign of the numerator depends on C . It can be verified that π_2 is minimal when $C = 0.5(3V'_1 - V'_2)$. Hence,

$$\frac{\partial \pi_2}{\partial C} > 0,$$

if

$$C \begin{matrix} > \\ < \end{matrix} 0.5(3V'_1 - V'_2).$$

This yields

Corollary E3: $C = V'_1$, if $V'_2 \geq \frac{V'_1(1 + \sqrt{5})}{2}$ and $C = 0$, if $V'_2 < \frac{V'_1(1 + \sqrt{5})}{2}$.

If the investor's expected profit decreases with the compensation, $\partial \pi_2 / \partial C < 0$, then he would set C as low as possible (i.e. $C = 0$). On the other hand, if

the investor's payoff is positively related to the compensation, $\partial\pi_2/\partial C > 0$, and $V'_2 > V'_1$, then he would "buy out" the workers. This means that he compensates the workers fully for their loss. In this case, the workers do not compete (the contest is degenerate), and the investor gains the ownership of the firm. The expected payoff of the investor, π_2 , in these cases is equal, respectively, to $(V'_2)^3/(V'_2 + V'_1)^2$ and $(V'_2 - V'_1)$.

The sign of the effect of a change in the compensation level on the probability of privatization is ambiguous. Specifically,

Corollary E4: $\frac{\partial \text{Pr}_2^*}{\partial C} > 0$, if $V'_2 - V'_1 > 0$.¹¹²

If $V'_2 < V'_1$, an increase in C decreases player 2's probability of winning the competition. In this case the increase in C does not necessarily improve the investor's situation.

a The Privatizing Authority

The government's financial goals are directed towards maximizing the company's net income flow over time.¹¹³ For a publicly owned company, the government would expect to receive the entire net income flow over years. However, if a company is privatized, the government would expect to receive the sale price P and an income flow from taxes on the privatized company at the current value of tV_2 , where $t \in [0, 1]$ denotes the effective tax rate on income and V_2 the income after privatization. In addition, the government has to take into account the externalities associated with public and private ownership.¹¹⁴ Let E_i denote the externalities, $i = 1, 2$. $E_2(E_1)$ represents the externalities

¹¹² $\partial \text{Pr}_2^*/\partial C = (V'_2 - V'_1)/(-2C + V'_2 + V'_1)^2$ and $\partial te^*/\partial C = (-2C^2 - (V'_2)^2 - (V'_1)^2 + 2C(V'_2 + V'_1))/(-2C + V'_2 + V'_1)^2$.

¹¹³ The government has both financial and nonfinancial aims for maintaining government companies. Among the nonfinancial goals are reducing unemployment, producing strategic and public products, developing remote geographical areas, and achieving political aims. Preventing unemployment is not motivated just by humane considerations, but also by narrow political interests. For example, Shleifer and Vishny claim that politicians are interested in government companies employing more workers in order to get their votes. They point out, for example, that companies have been established that are not productive and only pay salaries. Municipal services in the United States employ 20–30% more workers than required for a given level of output.

¹¹⁴ Privatization is likely to create positive externalities if, for example, granting loans and support from international financial institutions or foreign governments is conditional on carrying out privatization, as in countries such as Zambia, Costa Rica among others (see Cantor (1996)). Increased efficiency is also considered a positive externality (Shleifer and Vishny). Privatization may, however, create negative externalities if, for example, the new management fires employees, cuts wages, or changes the location of factories because of communication

if the privatization is (is not) undertaken. Let R denote the total costs of carrying out the privatization¹¹⁵. The expected payoff, π_3 , of a government interested just in social welfare is given by

$$\pi_3 = \text{Pr}_2 (P + tV_2 - R + E_2) + \text{Pr}_1 (E_1 + V_G) - (x_1^* + x_2^*) .$$

The probability that the company is privatized is $\text{Pr}_2 (= 1 - \text{Pr}_1)$. If privatized, the government sells the company at price P , receives taxes on the privatized company and the monetary equivalence of the externalities, and incurs the costs of the privatization process. If the firm is not privatized, the company remains under government ownership at its current value of V_G with an externality level of E_1 . In any case, the players' outlays are considered as wasteful resources (social loss). The objective of the privatizing authority, as stated above, is based on the assumptions that (i) this authority is benevolent, (ii) its decision is not affected by lobbying and (iii) it is concerned with the protection of the public welfare. To some extent this is contrary to the public-choice literature, which suggests that government bureaucrats, like politicians, are selfish (see Niskanen 1971). The above assumptions are relaxed below when we allow the objective function of the bureaucrat to be positively related both to the public welfare and to the total lobbying outlays. Although a leading player in the privatization game, the privatization authority must take into account political constraints, namely the existence of the political game between the competing interest groups and the resulting uncertainty regarding the winner of that game. This uncertainty forces the government, when devising its proposed policy proposal, to take into account the possibility that its proposal is approved as well as the possibility that it is rejected at the political level.

The privatizing authority, being aware of the contest between the players, determines the sale price $P \geq 0$ such that it maximizes π_3 .

Let P , $x_1(\cdot)$ and $x_2(\cdot)$ denote, respectively, the strategies of the government, the employees and the investor. Note that the strategies of the second movers are functions of the first mover's strategy. P^* , $x_1^*(\cdot)$ and $x_2^*(\cdot)$ are the subgame perfect equilibrium strategies of the first mover (the government) and the second movers (the employees and the investor). The price that satisfies the first- and second-order equilibrium conditions is given by P^* ,

$$P^* = -2C + V_1' + V_2 - [(C - V_1')(C + E_1 - E_2 + R + V_G - (1 + t)V_2)]^{0.5} . \quad (\text{E.26})$$

problems. On the macro-level, the negative externalities include an increase in unemployment, labor unrest, undesirable changes in the income distribution, reduced investments in certain sectors, and the costs of evaluating the company and finding potential buyers.

¹¹⁵ In developed financial markets in which company profits are known, the transaction costs are negligible.

Since

$$\frac{\partial \pi_3}{\partial C} = \frac{(P - V + V_1 - V_2)(E_1 - E_2 - P + R + V_G - tV_2)}{(-2C - P - V + V_1 + V_2)^2} > 0,$$

an increase (decrease) in the compensation payment raises the government's expected utility, π_3 , provided that $V'_2 > V'_1$ ($V'_2 < V'_1$) and $P + E_2 + tV_2 > E_1 + V_G$. Given P , when $V'_2 > V'_1$, it is worthwhile for the government to encourage the investor to pay compensation to the employees. In contrast, when $V'_2 < V'_1$, the implementation probability increases only if the investor decreases the compensation payment to the employees.

By Lemma E3 and Eq. (E.26), the equilibrium probability of privatization is given by

$$P_{12}^* = 1 - \sqrt{\frac{(V'_1 - C)}{(E_2 - E_1 - C - R - V_G + (1 + t)V_2)}}. \quad (\text{E.27})$$

The model predicts that high values of V_G , E_1 , and R reduce the probability of privatization. Thus, a good state-owned firm (high V_G) with favorable externalities, high E_1 , would be too expensive for the investor.¹¹⁶ Nevertheless, when the externalities are not affected by privatization, $E_2 = E_1$, and the cost of carrying out the privatization is zero, $R = 0$, then the probability of privatization tends to zero if the sum of the net value of the unprivatized company to the employees and to the government, $V'_1 + V_G$, approaches the net value of the privatized company to the investor plus the taxes that he pays after taking over the company, $(1 - t)V_2$.

Let us now consider the effect of changes in the different parameters ($R, E_1, E_2, t, V'_1, V_2, V_G$ and C) on the price set by the government, P^* . Given that $V'_1 - C > 0$, it can be verified that the sale price P^* rises with an increase in the direct costs of privatization R and with a decline in income from the government company (positive externalities E_1 and the current value of the company V_G). The reason for this is that the government, whose income has fallen as a result of privatization, would be interested in receiving higher compensation to make up for this loss. On the other hand, if the government expects to gain more income from the privatized firm, income derived from increased positive externalities, E_2 , or tax receipts, t , would reduce the company's sale price. The sale price decreases with an increase in the net utility to the employees from not carrying out the privatization and increases with an increase in V_2 .

The politicians can be selfish and be interested in obtaining the resources spent on lobbying and in being re-elected. Politicians who are concerned about

¹¹⁶ As already noted, empirical evidence does not always show an obvious link between ownership and performance. For a study of privatized firms in Britain, see Martin and Parker (1997). For a survey of industries with mixed ownership, see Willner (2001).

re-election care about welfare. In such a case the payoff function of the government would depend on both welfare and on the resources spent by the contestants. Suppose therefore that the government's payoff function is a composite utility function such that the objective of the privatizing authority, π_3 , and of the politicians who are interested in gaining hold of the lobbying efforts, $x_1 + x_2$, are weighted, respectively, by α and $(1 - \alpha)$ where $0 \leq \alpha \leq 1$. That is,

$$\pi_3^\alpha = \alpha \pi_3 + (1 - \alpha)(x_1^* + x_2^*) . \quad (\text{E.28})$$

The price that maximizes π_3^α is denoted by $P^{\alpha*}$ and is equal to

$$\begin{aligned} P^{\alpha*} = & -2C + V_1' + V_2 \\ & - [(C - V_1')(C - V_1' + \alpha(E_1 - E_2 + V_1' + R + V_G - (1 + t)V_2))]^{0.5} \alpha^{-0.5} . \end{aligned} \quad (\text{E.29})$$

Notice that when $\alpha = 1$, $P^{\alpha*} = P^*$. We therefore obtain,

Proposition E5: *If the government's payoff function is extended from π_3 to π_3^α , with $0 \leq \alpha < 1$, then the company's sale price is reduced, $P^* > P^{\alpha*}$, and the investor's rent-seeking efforts are increased, $x_2^* < x_2^{\alpha*}$, thereby increasing his chances of winning the competition, $\text{Pr}_2^* < \text{Pr}_2^{\alpha*}$. Since $\frac{\partial \pi_2}{\partial P} < 0$, his payoff also increases, that is, $\pi_2^{\alpha*} > \pi_2^*$.*

The equilibrium price is reduced due to the change in the payoff function of the government. Concomitantly, the investor's probability of winning the competition is increased. In this more general case the dependence of the privatizing authority on the political level is expressed by assigning the weight α to social welfare and the weight $(1 - \alpha)$ to the resources invested by the interest groups.

3 Budgetary Limitations

In the above discussion we have ignored budgetary limitations in deciding on the optimal level of outlays of the contestants. When there are no budget constraints, the probability of privatization depends on C and on the valuations of the firm but not on the relative economic strength of the players. Multinational companies and the employees in a public enterprise usually have different limitations on their affordable amount of lobbying. Let us assume that the employees are limited in the amount of resources they can spend to prevent the firm from being privatized, while the firm's lobbying is not constrained. That is, the employees face the budgetary constraint $x_1 \leq \bar{x}_1$. This exogenous budgetary constraint can be due, for example, to the effect of free riding within the group of employees or to imperfections of the capital market. Given this constraint we recalculate the probability of privatization

and the optimal price set by the government. We continue to assume that in the second stage of the game the players maximize their payoff by determining the optimal lobbying outlays (x_1^{**}, x_2^{**}) :

$$(x_1^{**}, x_2^{**}) = \begin{cases} \left(\frac{(V'_2 - C)(V'_1 - C)^2}{(-2C + V'_1 + V'_2)^2}, \frac{(V'_1 - C)(V'_2 - C)^2}{(-2C + V'_1 + V'_2)^2} \right) & \text{if } \frac{(V'_2 - C)(V'_1 - C)^2}{(-2C + V'_1 + V'_2)^2} \leq \bar{x}_1 \\ \left(\bar{x}_1, \sqrt{\bar{x}_1(V'_2 - C)} - \bar{x}_1 \right) & \text{if } \frac{(V'_2 - C)(V'_1 - C)^2}{(-2C + V'_1 + V'_2)^2} > \bar{x}_1 \end{cases}.$$

When the budget constraint is binding, $\frac{(V'_2 - C)(V'_1 - C)^2}{(-2C + V'_1 + V'_2)^2} > \bar{x}_1$, the probability of privatization is $\text{Pr}_2^{**} = 1 - \sqrt{\frac{\bar{x}_1}{V'_2 - C}} > \text{Pr}_2^*$. Thus in equilibrium, if the employees' lobbying is effectively constrained, then the probability of privatization increases relative to the case where the budget constraint is not binding. This probability only depends on the valuation of the firm to the investor and not to the employees. Moreover, the government has a good reason *not* to encourage the investor to compensate the employees, since an increase in the compensation has a negative effect on the chances of implementing privatization.

Let us consider how such a binding constraint affects the optimal price set by the government. It can be verified that

$$\frac{\partial P^{\alpha^*}}{\partial \bar{x}_1} = \frac{-\partial^2 \pi_3^\alpha(.) / \partial P \partial \bar{x}_1}{\partial^2 \pi_3^\alpha(.) / \partial P^2}.$$

By the second-order condition, $\partial^2 \pi_3^\alpha(.) / \partial P^2 < 0$. The sign of $\frac{\partial P^{\alpha^*}}{\partial \bar{x}_1}$ is therefore identical to the sign of $\frac{\partial^2 \pi_3^\alpha(.)}{\partial P \partial \bar{x}_1}$. Since

$$\frac{\partial^2 \pi_3^\alpha(.)}{\partial P \partial \bar{x}_1} = \frac{0.25 (C + P - V_2 - \alpha (-E_1 + E_2 - R + tV_2 - V_G + P))}{(V_2 - P - C)^{1.5} (\bar{x}_1)^{0.5}} < 0,$$

the price set by the government is inversely related to the employees' lobbying constraint $\bar{x}_1$. To sum up,

Proposition E6: *If the employees have a binding budgetary constraint on their lobbying expenditure, then*

1. *for a given price level P , a reduction in permissible lobbying outlays reduces the total lobbying expenditure and increases the probability of privatization, and*
2. *a reduction in permissible lobbying outlays increases the price set by the government, P^{α^*} .*

A more severe budgetary constraint on the employees reduces their lobbying outlays and therefore increases the probability of privatization (the investor's probability of winning the contest). By the second and less expected part of the Proposition, a more severe budgetary limitation increases the sale price set by the government. Note that the introduction of a budget constraint makes the players less symmetric. An increase in the company sale price decreases the net payoff (the stake) of the investor and thus makes the players more symmetric. We have obtained therefore that the increased asymmetry due to the budget constraint is partly offset by the reduction in the equilibrium sale price set by the government.

4 Summary

The application of a standard rent-seeking model contributes toward a more comprehensive economic theory of privatization. This chapter focuses on the government's decision to privatize and therefore on the political struggle among the interest groups that try to affect this decision. The interest groups lobby the politicians with the aim of gaining the privatization rents.

Our motivation to develop an economic theory that focuses on the political struggle of the privatization process is due not only to the need to understand the nature of the struggle between the involved interest groups, but also to the need to justify the selected mode of privatization or, alternatively, expose the reasons for the failure of some of the undertaken privatization methods.

We showed that it is not clear that the government would encourage the investor to compensate the employees since a change in the compensation level does not necessarily increase the chances of implementing privatization. Moreover, since the investor's expected utility depends on the compensation level, a government committed to compensating the employees should set it exogenously to avoid reducing his expected utility. Another option open to the government is to lower the sale price. The government would choose this option if it would maximize its expected utility, subject to the political struggle among the interest groups that try to affect this decision.

We extended our analysis, allowing the government's payoff function to be a composite utility that depends positively on two components: expected social welfare and lobbying efforts. The equilibrium price is reduced due to the change in the payoff function of the government. Concomitantly, the investor's probability of winning the competition and his expected payoff are increased. In this setting with beneficial privatization, selfish politicians and nonselfish bureaucrats, interestingly, increased selfishness increases the probability of privatization.

We also considered the effect of a budgetary constraint on the employees' lobbying outlays. A more severe budget constraint increases the probability of

privatization; however, it also increases the sale price set by the government. Moreover, it has been shown that with budgetary constraints, if the purchasing price is fixed, then the government has a good reason *not* to encourage the investor to compensate the employees since an increase in the compensation has a negative effect on the chances of implementing privatization.

XIV

Migration Policy

The effect of migration on the host countries is usually unclear. There exists a large literature on the effect migrants have on the local population, see for example, Benhabib (1996), Borjas (1994), (1995), Gang and Rivera-Batiz (1994), Schmidt, Stilz, and Zimmermann (1994), Zimmermann (1995) and more recently, Boeri, Hanson and McCormick (2002). One thing is apparent, except in unusual circumstances, Western countries tend to spend significant resources towards limiting the number and/or type of immigrants they allow into their countries. These limits are upheld via both border controls, through which undesired people are blocked from entering, and via internal enforcement, whereby undesired people are apprehended and expelled from the country (see, for example, Ethier (1986)).

Whatever way you look at it, whether migration has a positive, negative or no effect on the host country, the number of migrants in different western countries is very high. For example, in 1998 Denmark had 256,000 migrants that constituted 2.5% of the population, Finland 552,000 (1.6%), the UK 2,208,000 (3.8%), Belgium 892,000 (8.7%), France 3,231,000 (6.3%), Switzerland 1,347,000 (19%), Germany 7,319,000 (8.9%)¹¹⁷ and over 11.7 million foreign-born workers in the US.¹¹⁸ Moreover, there are many concentrations of migrants of the same origin in different host countries. For instance, there are concentrations of Turks in Germany, Tamils in Switzerland, Moroccans in the Netherlands and Belgium, Italians in Argentina, Greeks in Australia and Ukrainians in Canada. There are also more specific instances where emigrants from a certain town or region concentrate in the same foreign town or region. One of many such examples is the Macedonians from Skopje who have come to make up a sizable part of the population of Göteborg in Sweden. Such concentrations of migrants often cause xenophobia.

¹¹⁷ In the middle of the last century Germany was in need of workers, and actively sought temporary workers especially from Turkey. Many of these “temporary” workers remained in the country after the expiry of their contract.

¹¹⁸ Source: Boeri, Hanson and McCormick (2002).

Empirical evidence from the EU countries shows that immigration had at most a very small impact on wages and employment opportunities of natives. Nevertheless, in the 1997 Eurobarometer survey, immigration turns out to be one of the three most significant political or social issues. It is not surprising therefore that with a large number of migrants, the high unemployment rate in some of the host countries, xenophobia, and the perceived effect the migrants have on the local population (workers and capital owners), migration policy is becoming an important issue in some of the developed countries and, in particular, it has become a central issue in the elections held in these countries. Most of the evidence on the effect of immigrants on wages (and employment) for the US is also ambiguous in the sense that some studies show small positive effect and others small negative effect. This is the overall effect. Clearly, there are income-distribution effects (see Gang and Rivera-Batiz, 1994). The evidence is ambiguous. A summary of all the evidence was put together by the National Academy of Science, in a study that benefited from the participation of leading workers in a book edited by Smith and Edmonston (1997). It identifies the economic gains and losses from immigration – for the nation, states, and local areas – and provides a foundation for public discussion and policymaking. Borjas, who was a member of the committee, wrote a book in 1999 in which his interpretation of the data was, basically, that immigration of low-skilled workers into the US explains the substantial share of the deteriorating labor market position of low-skilled workers.

In order to understand better the ambiguity of the results, Dustmann and Preston (2004) broaden the economic argument, by allowing for consideration not only of factors relating to labor-market competition, but also of factors relating to public burden and efficiency considerations (they draw data from the European Social Survey (ESS)). Their analysis yields a set of interesting results. Their model suggests that economic self-interest points to an assessment of the benefits and costs from immigration that encompasses not only labor-market competition, but also taxes and public burden, as well as general welfare effects determined by efficiency considerations. Interpretations that focus solely on the competition aspect seem therefore quite narrow. Their empirical analysis supports findings in much of the previous literature of a strong relationship between education and more positive attitudes towards various issues relating to migration. They also find that the particular questions that focus on very particular concerns are all strongly related to the overall assessment of migration.

Therefore wages may well not be the only concern of the local workers. The utility of the local population may also be negatively related to the number of migrants as a result of xenophobia, desire not to interact with different cultures, the effect of the finance of public goods as well as welfare and distributional effects that adversely affect the local population.

Migration policy involves a large range of issues such as legal and illegal migrants, temporary and permanent migration, high-skilled and low-skilled migration and asylum seekers and family unification. Many studies have been

carried out regarding the optimal migration policy and the effects that different migration policies might have on the host country. Concern has been focused on whether to impose capital and skill requirements on the migrants, Benhabib (1996), on the alternative future policy options, given past experience, Zimmermann (1995),¹¹⁹ on whether a reform of immigration policy can alone resolve the fiscal problems associated with the aging of the baby boom generation, Storesletten (2000), on the preferred policy regarding temporary and illegal migration, Epstein (2003b), Epstein, Hillman and Weiss (1999) and Hillman and Weiss (1999) and on the migration policy implications of efficiency wage setting, Epstein and Hillman (2003). Other implications of migration policy are studied in Boeri, Hanson and McCormick (2002) and Bauer and Zimmermann (2002), see also references therein.

Even though there is a large literature concerned with migration policy, there is only one study on how in practice migration policy is determined.¹²⁰ Amegashie (2004) has recently studied a model in which the number of immigrants allowed into a country is the outcome of a costly political-lobbying process between a firm and a union using the all-pay auction contest.

As in Amegashie (2004), and following what was described in Chapters IV, XI and XII,¹²¹ we present a political framework where the approval of a migration policy hinges on the lobbying efforts of the groups competing for the approval and rejection of the proposed policy. In contrast to Amegashie (2004), we develop three alternative frameworks that allow a general contest success function that is positively affected by the different lobbying efforts of the contestants. It is assumed that there are two interest groups: one against the proposed quota and the other in favor of it. Those against the migrants include: workers that fear that they will be adversely affected by migration, anti-immigrant groups, immigrants of previous generations that prefer not to be joined by other migrants to the host country, etc. To simplify the discussion, we assume that this group is represented by the workers' union. On the other side stand the capital owners that prefer a higher migration quota than the workers. An example that illustrates such a situation is the different votes taken in Switzerland on limiting the number of migrants. On the 24th of September 2000, for example, there was a national vote on an initiative proposed by the right-wing party SVP to include the following passage in the constitution: "The government has to make sure that the proportion of for-

¹¹⁹ Zimmermann (1995) shows that there has been a limited positive effect on the labor market and thus there are only few alternative policy options in the future.

¹²⁰ For different aspects of the political economy of migration see Sollner (1999), Buckley (1996) and Cukierman, Hercowitz and Pines (1993).

¹²¹ Lobbying is an important part of the policy-making process in representative democracies, Grossman and Helpman (2001), Persson and Tabellini (2000). Several studies have addressed the issue to what extent lobbying affects policy? Modelling lobbying as a "menu-auction", Grossman and Helpman (1996) study a Downsian model of electoral competition where candidates choose policies to maximize their probability of winning the elections.

eigners living in Switzerland does not exceed 18 per cent".¹²² 36% voted in favor and 64% against the initiative (with a participation rate of 45% in the vote).¹²³

The objective of this chapter is to look at political economic considerations that determine migration quota. We base our work on the framework developed in Chapters IV and XI. We begin our analysis by considering the optimal migration quotas of the workers' union and the capital owners, assuming that each group behaves nonstrategically, sincerely revealing its preferred policy. The support of these first best policies is plausible, if each group believes that its preferred policy has no effect on the implemented policy. We then examine the preferred policy proposals when the interest groups recognize that the approval or rejection of their preferred policy depends on their lobbying efforts. The first objective of the chapter is to examine the effect of lobbying on the migration quota when the government is not involved in the proposal of the migration policy. We then introduce into the model a third player, a politician/bureaucrat who seeks to maximize a composite utility function that depends on two components: the expected social welfare and the lobbying efforts of the contestants. Both the welfare component and the lobbying component have a positive effect on the bureaucrat's utility. Our second objective is to determine the optimal migration quota in this extended setting and to clarify how does government intervention in the proposal of the quota affect its nature and how does a change in the weight assigned by the government to the public well being affect the endogenous determination of the migration quota. The effect of the existing status quo on the determination of the proposed policy of the government and on the probability of its approval or rejection has been neglected in the political economy literature. Our analysis of this effect clarifies that the status quo has an important role in determining the bureaucrat's proposal and the likelihood of its approval.

1 The Preferred Nonstrategic Migration Quotas

Migration affects both workers' earnings and utility and the profits of capital owners. Let us describe how migration quotas affect the two groups within a simple economic environment. As the number of migrants entering the host country increases, the labor-market conditions change. Foreign labor (migrants) can be either complementary inputs or substitute inputs to local labor. In the former case, an increase in the number of migrants increases the equilibrium wages of the local workers and thus their utility. That is, when foreign and local labor are complements, an increase in the migration quota increases

¹²² See <http://www.admin.ch/ch/e/pore/index3.html>

¹²³ Note that in Switzerland initiatives can be proposed by anyone (but not the government). The requirement to have a vote on them is that the proposers need 100,000 signatures of voters in order to prove that there is enough interest in the issue.

the local workers' utility.¹²⁴ On the other hand, if foreign and local labor are substitutes, an increase in the migration quota decreases wages and, in turn, the utility of the local workers.¹²⁵ In such a case the utility of the local workers is inversely related to the migration quota. We assume that, in general, the two types of labor can be complements only under low migration levels. If this occurs, then at a sufficiently high migration level, local and foreign labor become substitutes.^{126,127} We wish to note that, in contrast to the local population, an increase in the population of the immigrants increases the migration network externalities and, in turn, the utility of the migrants in the host country and, at the same time, it decreases the cost for other migrants to join the previous migrants at the host country (see for example, Gottlieb 1987, Church and King 1993 Carrington, Detragiache, and Vishwanath, 1996 and Chiswick and Miller 1996).

Denote the migration quota by Q and a representative worker's utility by u_w . The northwest quadrant (quadrant II) of Fig. E.2 presents the relationship between the migration quota and the utility of the local worker. For low migration quotas, there is a positive relationship between the quota and the local worker's utility. However, beyond the quota Q_w^* , an increase in the quota decreases the utility of the local worker, as the two types of labor become substitutes. Note that the utility of the local worker can be negative, although in the figure it is assumed to be positive and that it may well be the case that the local and foreign labor are always substitutes, in which case the curve in the figure is everywhere downward sloping.

Migration of foreign labor increases the capital owner's profits. When the two types of workers are substitutes, the increase in the labor supply decreases wages, and therefore production and the capital owners' profits are increased. It is assumed that even when the two types of workers are complements, although migration may increase wages, profits increase. Hence, capital owners always prefer an increase in the migration quota. Such an increase does not mean that the producers have to employ all the workers. It may well be that, due to the existence of government intervention, the marginal value of production is smaller than the cost of employing more workers. For example, in the case of the minimum wage, the producer may only employ workers that

¹²⁴ In an efficiency model where the migrants are the unemployed, for certain levels of migration, an increase in the quota increases the utility of the local population, Epstein and Hillman (2003)

¹²⁵ This utility may not be the actual one, but the perceived utility – the utility the local population expect under a given migration quota.

¹²⁶ We will discuss later the case where the profits of the capital owners continue to increase as a result of an increase in the number of migrants.

¹²⁷ Even though we only discuss the direct labor-market effect of migration, there may be other effects such as xenophobia, desire to refrain from interaction with different cultures, the effect of the finance of public goods as well as welfare and distributional effects that adversely affect the local population (for a more detailed analysis, see the Introduction).

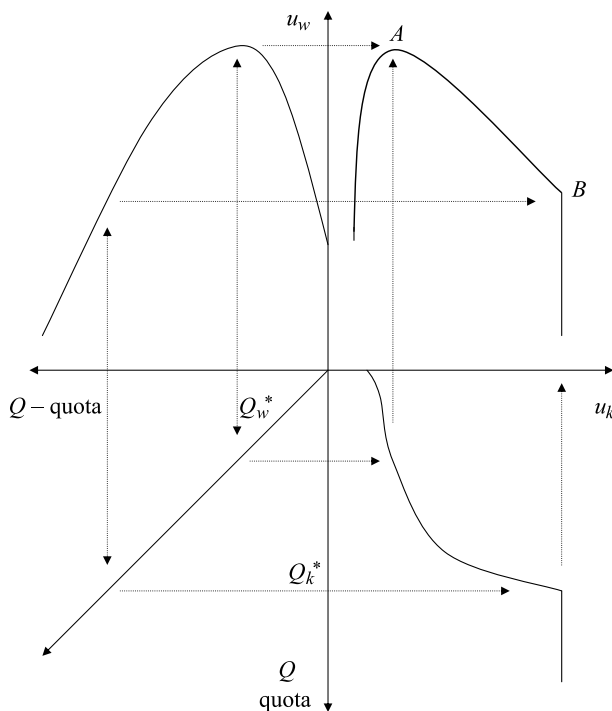


Fig. E.2.

contribute nonnegative marginal profit to the firm (the value of their marginal product exceeds the minimum wage). In such a situation, an increase in the migration quota does not increase or decrease the profits of the firm (we ignore the possibility that the burden of unemployed workers on the economy adversely affects the employers reducing their profits). Denoting by u_k the utility of the capital owners, the southeast quadrant of Fig. E2 presents the assumed positive relationship between the migration quota and the utility of the capital owners up to the quota Q_k^* .

The northeast quadrant describes the relationship between the utility of the capital owner and the utility of the local workers. Both utilities increase with the migration quota in the interval $[0, Q_w^*]$. Beyond Q_w^* , but below Q_k^* , an increase in the migration quota decreases the utility of the local workers, while increasing the utility of the capital owners. Increasing the migration quota beyond Q_k^* continues to reduce the utility of the workers, however, such an increase has no effect on the utility of the capital owners. As already noted, the utility of the local workers can always decrease with the quota and the utility of the capital owner may always decrease with the quota.¹²⁸

¹²⁸ These type of results can also be derived from a Heckscher–Ohlin international-trade model allowing international factor mobility (see Mundell, 1957).

In our models, competition between the two interest groups is over the migration quota. It is clear that both groups prefer the quota Q_w^* to any smaller quota. A conflict of interests only arises when the government contemplates a migration quota that exceeds Q_w^* . We therefore confine our analysis to the determination of migration quotas that are higher than Q_w^* .

2 The Effect of Lobbying: No Government Intervention in the Proposal Process

Suppose that a status-quo policy regarding the migration quota is challenged by the capital owners and defended by the worker's union. The workers' union, the defender of the status-quo policy, (henceforth interest group w or, simply, the workers) prefers the status-quo policy Q_w^* to any alternative policy. The capital owners, (interest group k) prefers the alternative policy Q_k^* . As argued above, $0 < Q_w^* < Q_k^*$. It is assumed that the policy Q_w^* (Q_k^*) is the optimal policy proposal of the workers (the capital owners), provided that their supported policy gains *certain approval*. That is, each interest group disregards the possibility that its preferred policy can be rejected, in which case the policy supported by the rival interest group is assumed to be approved. More generally, these quotas are preferred by the interest groups whenever they believe that the approved and implemented policy is independent of their behavior and, in particular, of their revealed preferred policies and the influence activities that are intended to promote the implementation of these preferred policies. In Fig. E.3 these most preferred policies and the corresponding utilities are represented, respectively, by point A, for the workers' union and point B, for the capital owners.¹²⁹

Under effective lobbying, the actual implemented policy depends on the contest between the workers' union and the capital owners and on the approval of their proposed policies. The equilibrium proposed policies, that are endogenously determined in our first alternative strategic settings, are denoted Q_k^{**} and Q_w^{**} . The outcome of the political contest is given in terms of the probabilities Pr_k and Pr_w that the workers and the capital owners win the contest. The outcome of the contest depends on the stakes of the contestants and, in turn, on their proposed policies and on their exerted lobbying or rent-seeking efforts. The important role of the political environment (the form of the government, its motivation and the decision rule it applies) is represented by the commonly used contest success function that specifies the relationship between the outcome of the contest and the proposed policies or the efforts of the interest groups.

¹²⁹ In a similar way, in the contest over monopoly regulation studied in Baik (1999), Ellingsen (1991) and Schmidt (1992), the monopoly firm is assumed to defend the status quo, its profit-maximizing price (against any price regulation), while the consumers challenge the status-quo lobbying for the competitive price (a tight price cap).

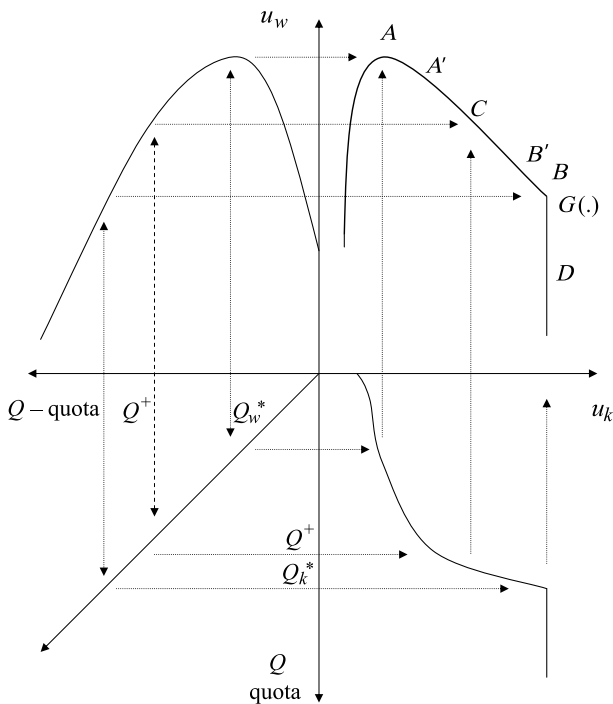


Fig. E.3.

As described in Chapter XI, the workers and capital owners make two types of decisions. In the first stage of the game, the interest groups noncooperatively select their proposed policies, the lobbying targets, Q_k and Q_w . In the second stage they engage in a contest over the approval of the proposed policies. The interest groups are assumed to precommit to their proposed policies and the commitments are feasible and are fully implemented after the contest.¹³⁰ The means of the workers and capital owners to affect the outcome of the contest, viz. their winning probabilities, in the second stage of the game is their lobbying or rent-seeking efforts x_k and x_w .¹³¹ The approval of the policy proposals Q_k and Q_w imply different utilities for the two interest groups. The benefit of the capital owners is $v_k(Q_k)$, if its proposal is approved and $v_k(Q_w)$, if the workers' union proposal is approved. In a similar way, the benefit of the workers' union is $v_w(Q_w)$, if its proposal is approved and $v_w(Q_k)$, if the capital owners' proposal is approved. The workers' union's and the capital

¹³⁰ For different rent-seeking games with an explicit time structure that allow for such commitment, see Baik and Kim (1997), Baye and Shin (1999) and Dixit (1987).

¹³¹ X_w and x_k are total lobbying efforts. An implicit assumption is thus made that the interest groups are able to fully overcome the free-riding effects.

owner's expected payoffs are given by Eq. (A.1):

$$E(w_j) = \Pr_i v_j(Q_i) + \Pr_j v_j(Q_j) - x_j \quad \forall i \neq j, \quad i, j = w, k, \quad (\text{E.30})$$

or,

$$E(w_j) = v_j(Q_i) + \Pr_j n_j(Q_j, Q_i) - x_j \quad \forall i \neq j, \quad i, j = w, k, \quad (\text{E.31})$$

where $n_j(Q_j, Q_i)$ is the stake of interest group j , that is, $n_k(Q_k, Q_w) = v_k(Q_k) - v_k(Q_w)$ and $n_w(Q_k, Q_w) = v_w(Q_w) - v_w(Q_k)$.

The utility functions v_k and v_w are assumed to be monotonic, continuous and twice differentiable on the interval $[Q_w^*, Q_k^*]$. Notice that when $Q_w = Q_k$ both stakes are equal to zero and that $\partial n_k / \partial Q_w < 0$ and $\partial n_w / \partial Q_k > 0$ on the interval $[Q_w^*, Q_k^*]$.

The function that specifies i 's probability of winning the contest, $\Pr_i(x_i, x_j)$, is usually referred to as a contest success function (CSF).

In our first two-stage game with complete information, a subgame perfect equilibrium can be calculated by using a standard backward induction procedure. The equilibrium effort levels x_k^{**} and x_w^{**} are determined in the second stage. These equilibrium lobbying efforts, which are assumed to be interior and unique, satisfy the conditions: $\frac{\partial E(u_i)}{\partial x_i} = 0, i = w, k$, that is,

$$\Delta_i = \frac{\partial \Pr_i}{\partial x_i} n_i - 1 = 0, \quad i = w, k. \quad (\text{E.32})$$

The interior equilibrium policy proposal Q_k^{**} and Q_w^{**} , which are determined in the first stage of the game, satisfy the conditions: $\frac{\partial E(w_i)}{\partial Q_i} = 0, i = w, k$. Given Eq. (E.32), these conditions can be written as follows:

$$\frac{\partial E(w_i)}{\partial Q_i} = \frac{\partial \Pr_i}{\partial x_j} \frac{\partial x_j}{\partial Q_i} n_i + \Pr_i \frac{\partial n_i}{\partial Q_i} = 0. \quad (\text{E.33})$$

It can be verified that the condition needed for applying the results of Chapter XI hold, thus by the two main results in that chapter, as long as the two interest groups engage in a viable contest in the second stage of the game, in equilibrium they are induced to voluntarily moderate their proposals relative to their best policies when there is no opposition. Specifically, the equilibrium policies Q_k^{**} and Q_w^{**} satisfy: $Q_k^{**} < Q_k^*$ and $Q_w^{**} > Q_w^*$. Although polarization is reduced, it is not eliminated. That is, an equilibrium with completely converging proposed policies is impossible. To sum up,

Under uncertain effective lobbying with no government intervention in the proposal of the migration quota, the workers' union and the capital owners moderate their proposals. However, the equilibrium policy proposals do not coincide.

This result, as mentioned above, is a specific case of the more general model presented in Chapter XI. The intuition for this result is as follows: If there

is no opposition the capital owners choose the policy Q_k^* . In the presence of an opposition, the capital owners realize that lowering their proposal for migration quota below Q_k^* leads to a decrease in their payoff from winning the contest. But the more restrained proposal yields an increase in the payoff of the opponent and, in turn, a reduction in his stake that induces him to become less aggressive. The resulting decline in the workers' union's probability of winning the contest clearly benefits the capital owners. Since the latter favorable effect dominates the former unfavorable effect, the capital owners prefer to restrain their lobbying target, i.e. propose a policy below the migration quota of Q_k^* . A similar intuition explains the readiness of the workers' union, the defender of the status quo, to moderate its position by proposing a policy that exceeds Q_w . For both the workers and the capital owners, a deviation from any agreed upon compromise results in a first-order increase in the expected payoff, $\Pr_i(Q_i, Q^*)n_i(Q_i, Q_j)$, and a second-order reduction in the expected payoff, $-x_i$. Consequently, both interest groups are induced to deviate from any agreed upon proposal and conflict is a necessary outcome of the interaction in our game. Since there always remain effective incentives for the interest groups to engage in a viable contest, wasteful resources are expended in the second stage of the game. Note that the interest groups could, of course, increase their expected payoffs by agreeing to cut down their lobbying efforts by the same proportion. This implies that the equilibrium of the quota-determination game is inefficient.

3 Government Intervention in Determining the Proposed Quota Assuming a Given Status-quo Policy

Suppose now that the proposed migration quota is determined by the government (a bureaucrat) and not by the interest groups (see Chapter IV). In this alternative setting, the stakes of the two groups are equal to the utility differences of the interest groups corresponding to the status quo and the proposed migration quotas. The stakes do not only depend on the proposed policy by the government, Q^+ , but also on the status-quo policy: the stakes are defined as $n_k(Q_k, Q_s) = |v_k(Q^+) - v_k(Q_s)|$ and $n_w(Q^+, Q_s) = |v_w(Q^+) - v_w(Q_s)|$ where Q_s is the status-quo policy. The status quo, of course, affects both the stakes and the expected payoffs of the interest groups. In this subsection we concentrate on the choice of the migration quota given a status-quo policy. In the next subsection we will consider the effect of a change in the status quo on the proposed policy. Clearly, a viable contest exists, if and only if the proposed policy differs from the status quo.

In general, the stakes of the contestants are different, that is, one of them has an advantage over the other in terms of his benefit from winning the contest. It is not clear which of the groups has a larger stake. The ratio n_w/n_k is a measure of the asymmetry between the stakes of the contestants.

By the expressions in Eq. (E.33) that determine the equilibrium efforts of the players and, in turn, their probabilities of winning the contest and by the assumed properties of the CSF, it is clear that under a symmetric contest success function¹³² ($\forall x_i, x_j, \Pr_i(x_i, x_j) = \Pr_j(x_j, x_i)$), the player with the higher stake makes a larger effort and has a higher probability of winning the contest.

By definition of the stakes (see Eqs. (E.30) and (E.31)) a change in the proposed migration quota affects the stakes of the players and, therefore, their efforts and probability of winning the contest. Assuming that the stake functions $n_i(Q)$ ($i = w, k$) are continuous and twice differentiable in the quota Q , let $n'_i = \frac{\partial n_i}{\partial Q}$. By assumption,

$$\frac{\partial n_w}{\partial Q} > 0 \quad \text{and} \quad \frac{\partial n_k}{\partial Q} > 0, \quad \text{if } Q_w^* \leq Q \leq Q_k^*, \quad (\text{E.34})$$

and

$$\frac{\partial n_w}{\partial Q} > 0 \quad \text{and} \quad \frac{\partial n_k}{\partial Q} = 0, \quad \text{if } Q_k^* < Q. \quad (\text{E.35})$$

That is, an increase in the migration quota increases the utility of the capital owners and, in turn, their stake. Such an increase also increases the local workers' stake because an increase in quota decreases the utility of the workers so they have more to lose if the proposal is approved. Usually, a certain number of migrants is beneficial to the workers, see, for example, Epstein and Hillman (2002) and Epstein (2003). To simplify the analysis, we confine our attention to quota proposals beyond the quantity that improves the local workers' utility. From Eq. (E.35), an increase in the number of migrants beyond Q_k^* is not beneficial to the capital owners, that is, an increase of the quota beyond Q_k^* has no effect on the capital owners' utility. Consequently, the producers would not employ more than Q_k^* foreign workers. We could envisage a situation where an increase in the number of migrants imposes a cost on the economy and, in particular, on the employers. This possibility, however, is also disregarded.

As in Chapter IV, anticipating the behavior of the interest groups in the second stage of the game, where the lobbying outlays are determined, the bureaucrat selects his strategy, that is, the proposed migration quota in the first stage of the game. In other words, he selects a policy proposal subject to the political constraint imposed by the bureaucrat, namely, subject to the contest on the approval of his proposal. In general, the bureaucrat's objective function reflects mixed commitments to the enhancement of the public well being and to his own self-interest, which is represented herein by the contestants' lobbying outlays. As assumed in (A.18) the objective function $G(\cdot)$ is of the form

$$G(\cdot) = \alpha (E(w_w) + E(w_k)) + (1 - \alpha) X, \quad (\text{E.36})$$

¹³² Such symmetry implies that the two players share an equal ability to convert effort into probability of winning the contest.

where $E(w_w)$ and $E(w_k)$ are the expected net payoffs of the workers and the capital owners. The contestants' total lobbying outlays, $X = x_w + x_k$, represent either transfers to the government (the bureaucrat and/or the regulator) or resources wasted in the contest. Note that taking into account the public interest is consistent with the bureaucrat being either benevolent or realistic (wishing to be re-elected).¹³³ The utility of the bureaucrat is thus a weighted average of both welfare, $E(w_w) + E(w_k)$, and the total amount of the lobbying outlays, X . The parameters α and $(1 - \alpha)$ are the weights assigned to the components corresponding to the expected social welfare and the contestants' lobbying outlays. The optimal migration quotas in the nonstrategic setting of Sect. 2 are represented by points A and B in Fig. E.3. The equilibrium quotas for the workers and the capital owners in the strategic game analyzed in the Sect. 3 are represented, respectively, by points A' and B'. The equilibrium migration quota in the current game can be represented by a point like C, a point like D or by any other point on the utility possibility frontier of Fig. E.3. A point like C implies that the intervention of the government in the proposal of the quota is compromise enhancing, both relative to the first nonstrategic situation and relative to the strategic situation of the preceding section. A point like D implies that quota determination by the government may result in the approval of a quota that is more extreme both relative to Q_k^* and Q_k^{**} . The main concern of the analysis below is the question how does government intervention in the quota proposal affect the proposed quota.

The anticipated equilibrium lobbying efforts x_k^+ and x_w^+ that are determined in the second stage of the game are characterized by conditions (E.32). The condition characterizing the subgame perfect equilibrium migration quota Q^+ (the quota that maximizes $G(\cdot)$, given the anticipated lobbying outlays) is:¹³⁴

$$\frac{\partial G(\cdot)}{\partial Q} = \alpha \frac{\partial (E(u_k^+) + E(u_w^+))}{\partial Q} + (1 - \alpha) \frac{\partial X^+}{\partial Q} = 0. \quad (\text{E.37})$$

To clarify the relationship between the bureaucrat's equilibrium migration quota Q^+ and the interest groups' equilibrium proposed quotas with no government intervention in the quota proposal, Q_w^{**} and Q_k^{**} , consider the first-order condition (E.38) at the two migration quotas Q_w^{**} and Q_k^{**} .

$$\left. \frac{\partial G(\cdot)}{\partial Q} \right|_{Q=Q_i^{**}} = \alpha \left. \frac{\partial (E(u_k) + E(u_w))}{\partial Q} \right|_{Q=Q_i^{**}} + (1 - \alpha) \left. \frac{\partial X}{\partial Q} \right|_{Q=Q_i^{**}}, \quad i = w, k. \quad (\text{E.38})$$

¹³³ In contrast to the recent literature on public-policy determination in representative democracies, Grossman and Helpman (2001), Persson and Tabellini (2000), in our two-stage reduced-form public-policy contest, the effect of the often elaborate relationship between the public well being and the probability of re-election on the behavior of the bureaucrat is disregarded.

¹³⁴ We assume that the second-order condition holds.

By the definition of Q_w^{**} and Q_k^{**} , $\left. \frac{\partial E(u_w)}{\partial Q} \right|_{Q=Q_w^{**}} = 0$ and $\left. \frac{\partial E(u_k)}{\partial Q} \right|_{Q=Q_k^{**}} > 0$, whereas $\left. \frac{\partial E(u_w)}{\partial Q} \right|_{Q=Q_k^{**}} < 0$ and $\left. \frac{\partial E(u_k)}{\partial Q} \right|_{Q=Q_k^{**}} = 0$. For the bureaucrat's equilibrium policy to coincide with one of the interest groups' equilibrium policies Q_w^{**} or Q_k^{**} , one of the following equalities must be satisfied:

$$\left. \frac{\partial G(.)}{\partial Q} \right|_{Q=Q_i^{**}} = \alpha \left. \frac{\partial E(u_j)}{\partial Q} \right|_{Q=Q_i^{**}} + (1 - \alpha) \left. \frac{\partial X}{\partial Q} \right|_{Q=Q_i^{**}} = 0, \quad i = w, \quad \text{or} \quad i = k, \quad (\text{E.39})$$

or

$$\alpha \left. \frac{\partial E(u_j)}{\partial Q} \right|_{Q=Q_i^{**}} = - (1 - \alpha) \left. \frac{\partial X}{\partial Q} \right|_{Q=Q_i^{**}}, \quad i = w, \quad \text{or} \quad i = k. \quad (\text{E.40})$$

Given that α and $(1 - \alpha)$ are the weights the bureaucrat assigns to social welfare and to the total lobbying outlays, condition (E40) requires that the marginal value of the lobbying outlays must equal the marginal value of social welfare. From Eq. (E40), if $\left. \frac{\partial X}{\partial Q} \right|_{Q=Q_k^{**}} > 0$, then the bureaucrat's equilibrium quota cannot coincide with the workers' equilibrium quota Q_w^{**} . And if $\left. \frac{\partial X}{\partial Q} \right|_{Q=Q_k^{**}} < 0$, then the bureaucrat's equilibrium quota Q^+ cannot coincide with the capital owners' equilibrium quota Q_k^{**} . The bureaucrat's proposed quota Q^+ can be between Q_w^{**} and Q_k^{**} , and be represented by a point such as C in Fig. E.3. In such a case government intervention enhances compromise. However, it is possible that Q^+ is higher than Q_k^{**} or lower than Q_w^{**} . From Eq. (E.39), the former situation occurs, that is, $Q^+ > Q_k^{**}$, if

$$\alpha \left. \frac{\partial E(u_w)}{\partial Q} \right|_{Q=Q_k^{**}} > - (1 - \alpha) \left. \frac{\partial X}{\partial Q} \right|_{Q=Q_k^{**}}. \quad (\text{E.41})$$

The latter situation occurs, that is, $Q^+ < Q_w^{**}$ if

$$\alpha \left. \frac{\partial E(u_k)}{\partial Q} \right|_{Q=Q_w^{**}} > - (1 - \alpha) \left. \frac{\partial X}{\partial Q} \right|_{Q=Q_w^{**}}. \quad (\text{E.42})$$

Therefore, to satisfy Eq. (E.41), it must be the case that $\left. \frac{\partial X}{\partial Q} \right|_{Q=Q_k^{**}} > 0$ and

to satisfy Eq. (E.42), it must be that $\left. \frac{\partial X}{\partial Q} \right|_{Q=Q_w^{**}} < 0$.

As we can see, all the conditions stated above are related to the relationship between a change in the proposed policy and the change in the lobbying efforts of the contestants, $\frac{\partial X}{\partial Q}$. The effect of a change in the proposed quota may have a positive, negative or no effect on the lobbying outlays. In the Appendix we present conditions that clarify the role of stakes asymmetry and ability asymmetry between the workers and the capital owners in determining the

sign of $\frac{\partial X}{\partial Q}$. These conditions imply, in particular, that it is possible that the two contestants are induced to decrease their aggregate effort when the quota is increased. This occurs when the negative rival's-stake effect of the contestant who is induced to increase his effort more than counterbalances the sum of the two positive own-stake effects and his opponent's positive substitution effect. Notice that if the quota level is sufficiently high, $Q_k^* < Q$, then the aggregate effort may increase.¹³⁵

To sum up,

1. *If a change in the migration quota positively (negatively) affects the total lobbying efforts of the workers and the capital owners, $\frac{\partial X}{\partial Q} < 0$, then the bureaucrat's proposed quota cannot coincide with the workers' (capital owners') proposed quota.*
2. *The bureaucrat's proposed quota can be more extreme than the quota proposed by the capital owners or by the workers.*

While in Chapter XII, it is argued that the proposed policy may be more extreme than the preferred proposals of the two groups, here we show conditions under which the migration quota will not coincide with that of one of the groups. Specifically, if the total effort invested in the contest is positively related to the proposed policy, then the proposed quota will not coincide with the worker's unions preferred policy and if the expenditure is negatively related to the proposed policy, then the policy will never coincide with the capital-owners' preferred policy. This result establishes that the proposed policy of the bureaucrat may coincide with one of the proposals of the interests groups. This depends on the effect a change in the proposal has on the total lobbying efforts exerted by the interest groups. Moreover, the proposal can be more extreme than that proposed by either interest group. For example, for the bureaucrat to propose a quota that is higher than the quota proposed by the capital owners, total lobbying outlays must be positively related to the proposed quota at the policy proposed by the capital owners. The intuitive rationale behind this result is that the bureaucrat will only choose such a policy if he benefits from the proposed increase in the quota. Remember that an increase in the quota does not change the capital owners' stake, however, it does increase the workers' stake, namely it makes them worse off. Yet, if such

¹³⁵ Note that the two type of situations, the one where the interest groups determine the proposed policies and the one where the bureaucrat determines the proposed policy, can be combined in the following way: define $\text{Pr}_k^1 = \beta \text{Pr}_k$ and $\text{Pr}_w^1 = \beta \text{Pr}_w$, where $0 < \beta \leq 1$. Then $\text{Pr}_k + \text{Pr}_w < 1$ which implies that $1 - \beta \geq 0$ is the probability that neither of the proposals by the lobbyists will be chosen. In other words, $1 - \beta$ is the probability that the status quo will be chosen by the bureaucrat. The bureaucrat will choose β to maximize his payoff. If $\beta = 1$, the bureaucrat will chose the status quo. If the contest success function is $\text{Pr}_i = \frac{x_i}{x_j + x_i}$ (Tullock, 1980), then the total expenditure of the groups is a linear function of β . Therefore, if the bureaucrat's objective is to maximize the resources invested in the contest, then he/she will choose a corner solution.

a proposal increases the lobbying outlays, the bureaucrat may still gain from such a proposal. Clearly, the bureaucrat can only gain from such a proposal, if the increase in the quota results in an increase in the lobbying efforts. Under such circumstances the capital owners prefer a quota that exceeds the one supported by the workers. The equilibrium migration quota proposed by the bureaucrat may well be higher (or lower) than the quotas preferred by both the workers and the capital owners.

When the migration quota is higher (lower) than that preferred by the capital owners, migrants or local workers will be unemployed (there will be a shortage of workers). In the case of a higher migration quota, the capital owners do not have to employ the migrants and, therefore, as can be seen in Fig. E.3, their utility is not reduced when the quota is increased.

Let us now discuss how robust the results are to the assumption presented earlier that after a migration quota of Q_k^* the profits of the capital owners either decrease or do not change. The question we would like to examine at this point is what happens if the profits continue to increase as a result of an increase in the number of migrants. Namely, there is no limit to the maximum number of migrants that the employers could use. Under this new assumption, the capital owners will always prefer more migrants and the workers will always want Q_w^* . Therefore, the bureaucrat's proposed quota can be more extreme than the quota proposed by the workers, however, it may equal to or be less than the optimal number of migrants of the capital owners (who may be interested in an infinite number of migrants). Result *b* presented above would therefore remain valid for the workers, but it will no longer hold for the capital owners.

Let us finally consider how does α , the weight assigned to social welfare, affect the proposed migration quota Q^+ . Recall that an increase in α implies a reduction in the weight assigned to the lobbying outlays. A decrease in α can thus be interpreted as an indication that the government becomes more politicized as it cares more about its narrow interest and less about the public well being. The bureaucrat who is a leading player maximizes $G(\cdot)$, being aware of the equilibrium lobbying outlays corresponding to the possible migration quotas. The first-order condition that characterizes an interior subgame perfect equilibrium quota proposal is stated in (E.37). This condition can be rewritten as

$$\frac{\partial(E(u_w) + E(u_k))}{\partial Q} = -\frac{(1-\alpha)}{\alpha} \frac{\partial(x_w + x_k)}{\partial Q}. \quad (\text{E.43})$$

It can be verified that

$$\frac{\partial Q}{\partial \alpha} = \frac{-\partial^2 G(\cdot) / \partial Q \partial \alpha}{\partial^2 G(\cdot) / \partial Q^2}.$$

By the second-order condition, $\frac{\partial^2 G(\cdot)}{\partial Q^2} < 0$. As in Chapter IV, by using the first-order conditions, we conclude that the derivative $\frac{\partial Q}{\partial \alpha}$ and the derivative $\frac{\partial X}{\partial Q}$

have opposite signs. That is, $\text{Sign}\left(\frac{\partial Q}{\partial \alpha}\right) = -\text{Sign}\left(\frac{\partial X}{\partial Q}\right)$. Hence, *if a change in the quota positively (inversely) affects the total lobbying efforts, then a change in the weight assigned by the government to social welfare inversely (positively) affects the migration quota proposed by the bureaucrat.*

This result emphasizes the critical significance of the sensitivity of X to variations in the proposed quota Q in determining the sensitivity of the optimal quota policy Q to the parameter α . In particular, an increase in $(1 - \alpha)$, the degree of politicization of the government, may result in an increase or a decrease in the proposed migration quota.

4 The Relationship Between the Status Quo and the Proposed Policy

As we will show, the status quo affects the policy proposed by the government.¹³⁶ In order to explain this relationship, let us consider, for a fixed proposed policy, the effect of a change in the status quo on the stakes and on the expected payoffs of the groups.

Recall that the stakes of the interest groups $n_j, j = w, k$, do not depend just on the policy chosen by the government Q^+ , but also on the status-quo policy: the stakes are defined as $n_k(Q_k, Q_s) = |v_k(Q^+) - v_k(Q_s)|$ and $n_w(Q^+, Q_s) = |v_w(Q^+) - v_w(Q_s)|$, where Q_s is the status-quo policy. The stakes are equal to the absolute difference between the two values of $v(\cdot)$. For a certain interest group, the new proposal may be better or worse, relative to the status quo. For example, if the status quo is $Q_s = (Q_w^{**} + Q_k^{**})/2$ and the proposed government policy is Q_k^{**} , then the stake of the capital owner is

$$n_k\left(Q^+ = Q_k^{**}, Q_s = \frac{Q_w^{**} + Q_k^{**}}{2}\right) = \left|v_k(Q_k^{**}) - v_k\left(\frac{Q_w^{**} + Q_k^{**}}{2}\right)\right|$$

and the stake of the workers is

$$n_w\left(Q^+ = Q_k^{**}, Q_s = \frac{Q_w^{**} + Q_k^{**}}{2}\right) = \left|v_w(Q_k^{**}) - v_w\left(\frac{Q_w^{**} + Q_k^{**}}{2}\right)\right|.$$

However, if the status quo is $Q_s = Q_w^{**}$ and the government's proposal equals to Q_k^{**} , then the union's stake will be

$$n_k(Q^+ = Q_k^{**}, Q_s = Q_w^{**}) = |v_k(Q_k^{**}) - v_k(Q_w^{**})|$$

and the worker's stake will be

$$n_w(Q^+ = Q_k^{**}, Q_s = Q_w^{**}) = |v_w(Q_k^{**}) - v_w(Q_w^{**})|.$$

It is clear therefore that the stakes in the first example, $Q_s = (Q_w^{**} + Q_k^{**})/2$ and $Q^+ = Q_k^{**}$ are smaller than the stakes when $Q_s = Q_w^{**}$ and $Q^+ = Q_k^{**}$.

¹³⁶ We thank an anonymous referee for pointing out this issue.

That is,

$$n_k \left(Q^+ = Q_k^{**}, Q_s = \frac{Q_w^{**} + Q_k^{**}}{2} \right) < n_k (Q^+ = Q_k^{**}, Q_s = Q_w^{**}), \quad (\text{E.44})$$

and

$$n_w \left(Q^+ = Q_k^{**}, Q_s = \frac{Q_w^{**} + Q_k^{**}}{2} \right) < n_w (Q^+ = Q_k^{**}, Q_s = Q_w^{**}). \quad (\text{E.45})$$

The expected payoffs and expenditures of the groups will therefore be different under the two different situations. Hence, the optimal government proposals in these situations may be different. If the government's objective is to maximize the total amount of resources invested by the groups, X , and, the contest success function is $\text{Pr}_i = \frac{x_i}{x_i + x_j}$ (Tullock, 1980), then it can be shown that the total expenditure in the contest will be equal to:

$$X^* = \frac{n_w n_k}{n_w + n_k}. \quad (\text{E.46})$$

For a given government's proposal, Q^+ , let us examine how the total amount of resources invested in the contest are affected by a change in the status quo:

$$\frac{\partial X^*}{\partial Q_s} = \frac{n_k n_w n'_k}{(n_w + n_k)^2} \left(\frac{\eta_w}{\eta_k} + \frac{n_w}{n_k} \right), \quad (\text{E.47})$$

where $\eta_j = \frac{\partial n_j}{\partial Q_s} \frac{Q_s}{n_j} = n'_j \frac{Q_s}{n_j}$ is the elasticity of player j 's stake (benefit) with respect to a change in the status quo. Consider the case where the status quo is the number of migrants that maximizes the workers' stake, Q_w^* , and this is also the government's proposal. In this case there will be no contests and the total expenditure would be equal to zero, $X^* = 0$. If the status quo is higher than Q_w^* and lower than Q_k^* , then the higher the status quo, the larger are the stakes of the groups: $\frac{\partial n_j}{\partial Q_s} = n'_j > 0$ and $\eta_j > 0$, $j = w, k$, and therefore $\frac{\partial X^*}{\partial Q_s} > 0$.

On the other hand, if the government's proposal is Q_k^* and the status quo is lower than Q_k^* and higher than Q_w^* , then a higher status-quo level will increase the worker's stakes while it will decrease the capital owner's stakes, $\frac{\partial n_w}{\partial Q_s} > 0$, $\frac{\partial n_k}{\partial Q_s} < 0$, $\eta_w > 0$ and $\eta_k < 0$ and therefore the sign of $\frac{\partial X^*}{\partial Q_s}$ is not clear. The sign of $\frac{\partial X^*}{\partial Q_s}$ depends on the relationship between the stakes and the elasticities in the following way:

$$\text{if } -\frac{\eta_w}{\eta_k} = \frac{n_w}{n_k}, \quad \text{then } \frac{\partial X^*}{\partial Q_s} = 0.$$

In other words, increasing the status quo decreases the capital owners' stake and thus they *may* invest less effort in the contest, while at the same time the

workers' stake is increased and this *may* increase their investment. The net effect on the total expenditures is unclear.

The examples above illustrate that different status-quo levels may give rise to different proposed policies. In general, it is not clear how a change in the status quo will affect the optimal proposed government's policy. It is clear, however, that for each status quo there is an optimal policy. In order to clarify the exact relationship between the proposed policy and the status quo, one must calculate the sensitivity of the optimal government's policy with respect to changes in the status quo, namely, $\frac{\partial Q^+}{\partial Q_s}$. It can be verified that

$$\frac{\partial Q^+}{\partial Q_s} = \frac{-\partial^2 G(.) / \partial Q \partial Q_s}{\partial^2 G(.) / \partial Q^2}.$$

Since $\frac{\partial^2 G(.)}{\partial Q^2} < 0$, the sign of $\frac{\partial Q^+}{\partial Q_s}$ equals to the sign of $\frac{\partial^2 G(.)}{\partial Q \partial Q_s}$. $G(.)$ depends on both of the expected net payoff of the interest groups and on the total expenditure of the groups. Therefore, as we have seen above, the status quo will affect both the expected net payoffs and the expenditures of the groups.

a Further Implications

The fact that the status quo affects the proposed policy may well have many political consequences. For example, a government in power can determine a policy that will become the status quo in the next period, in order to affect future changes in the policy, see for example Glazer, Gradstein and Konrad (1998) who provide conditions under which politicians in power determine policies that become the status quo and by doing so directly affect the probability of being re-elected. Moreover, if the bureaucrat can propose policy changes in every period, he may wish to make few changes, one in each period, rather than one change in the first period. A possible reason for behavior is that, by creating many contests rather than one contest, the bureaucrat may increase his own expected payoff. On the other hand, the bureaucrat may propose a very extreme policy with a very small probability of approval. Such extreme policy may have a low probability of being approved; however, it may generate a high return to the bureaucrat. The bureaucrat may propose such extreme "negative" policies, if he knows that in the next period it can create a contest with an outcome that compensates for his reduced return yield in the previous period.

When we compare the determination of quotas for high- and low-skilled migrants the status quo may well play a major role. There seems to be less opposition to high-skilled migrants than to low skilled migrants (see, for example, Boeri, Hanson and McCormick, 2002 and Dustmann and Preston 2004). Thus, if the government wishes to increase resources invested by the interest groups, then it will probably need to propose more extreme quotas for high-skilled workers than for low-skilled workers.

5 Summary

In this chapter we analyze the endogenous determination of migration quota in a political economic setting. We describe a contest between two interest groups, local workers (representing those groups that oppose migration) and capital owners who have different preferences regarding the migration quota. The capital owners prefer a larger quota relative to the workers. The two groups have conflicting interests regarding the approval or rejection of the proposed migration policy.

We began by identifying the nonstrategic optimal quotas of the interest groups assuming that the proposed policy is independent of their behavior. We then introduced the first strategic game where the interest groups propose alternative quotas and the bureaucrat determines which policy is approved. In this setting the government does not intervene in the determination of the quota proposal. From the first result, the effect of lobbying on the random behavior of the bureaucrat is compromise enhancing. That is, both the workers and the capital owners moderate their proposals when lobbying affects the approval of their supported policies. However, even though lobbying induces the contestants to propose “closer” policies, the proposals do not coincide.

In contrast to the first result, the effect of government intervention in determining the proposed quota on the nature of the quota is ambiguous. That is, when a bureaucrat proposes a migration quota, his proposed quota need not be compromise enhancing relative to the proposal of the workers or the capital owners in the previous case. The implemented quota can even be more extreme (higher) than the optimal quota of the capital owners in the nonstrategic setting. The second result specifies the conditions that give rise to moderate and extreme quota determination by the government. We provide conditions that ensure that the proposed policy will never coincide with one of the groups’ preferred policy and we show that the proposed policy depends on the existing status quo. In different economies with different status quos we will see different proposals. In other words, the existing status-quo policy plays a major role in determining the proposed policy.

Finally, we consider the effect of changes in the weight assigned by the bureaucrat to the public well being on the proposed quota. It has been shown that a decrease in the weight assigned by the bureaucrat to social welfare may increase or decrease the migration policy. The ambiguity is due to the ambiguity of the effect of a change in the proposed migration policy on the total lobbying efforts of the workers and the capital owners in the contest over the approval or rejection of the proposed quota. The conditions resolving this ambiguity are derived in the Appendix.

The struggle over migration policy is becoming a very important issue in the EU and in the US. Our results provide some preliminary insights into the economics behind the struggle over migration policy. In particular, they clarify the role of strategic lobbying, the role of government intervention in the determination of the proposed quota and the role of the nature of the

government (the weight it assigns to social welfare relative to the lobbying outlays) on the migration quotas in different countries.

Appendix

Using Eq. (E.33) with $Q_i = Q$, we obtain that the Nash equilibrium efforts satisfy the following conditions:

$$\frac{\partial x_i^{**}}{\partial Q} = \frac{n_i \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial \text{Pr}_j}{\partial x_j} \frac{\partial n_j}{\partial Q} - n_j \frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial \text{Pr}_i}{\partial x_i} \frac{\partial n_i}{\partial Q}}{n_i n_j \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right)}, \quad i \neq j, \quad i, j = w, k. \quad (\text{Ea.1})$$

Rewriting Eq. (Ea.1) together with the first-order conditions, we obtain that:

$$\frac{\partial x_i^{**}}{\partial I} = \frac{1}{B} \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \eta_j n_i - \frac{1}{B} \frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \eta_i n_j, \quad i \neq j, \quad i, j = w, k, \quad (\text{Ea.2})$$

where

$$B = Q n_i n_j \left(\frac{\partial^2 \text{Pr}_j}{\partial x_j^2} \frac{\partial^2 \text{Pr}_i}{\partial x_i^2} - \frac{\partial^2 \text{Pr}_i}{\partial x_i \partial x_j} \frac{\partial^2 \text{Pr}_j}{\partial x_i \partial x_j} \right) > 0$$

and $\eta_j = \frac{\partial n_i}{\partial Q} \frac{Q}{n_i}$. All values are computed at the Nash equilibrium. The effect of a change in the quota on the total effort invested in the contest by the capital owners and the workers, X^* , is given by:

$$\begin{aligned} \frac{\partial X^+}{\partial Q} &= \frac{\partial x_k^*}{\partial Q} + \frac{\partial x_w^*}{\partial Q} \\ &= \frac{1}{B} \left(\frac{\partial^2 \text{Pr}_k}{\partial x_k \partial x_w} (\eta_L n_k - \eta_{kH} n_w) - \left(\frac{\partial^2 \text{Pr}_k}{\partial x_k^2} \eta_w n_k + \frac{\partial^2 \text{Pr}_w}{\partial x_w^2} \eta_k n_w \right) \right) \quad (\text{Ea.3}) \end{aligned}$$

Hence,

If $Q_k^* > Q > Q_w^*$ then

$$\frac{\partial X^+}{\partial Q} > 0 \Leftrightarrow \frac{\partial^2 \text{Pr}_k}{\partial x_k \partial x_w} (\eta_w n_k - \eta_k n_w) > \frac{\partial^2 \text{Pr}_k}{\partial x_k^2} \eta_w n_k + \frac{\partial^2 \text{Pr}_w}{\partial x_w^2} \eta_k n_w,$$

$$\text{and if } Q_k^* < Q \text{ then } \frac{\partial X^+}{\partial Q} > 0 \Leftrightarrow \frac{\partial^2 \text{Pr}_k}{\partial x_k \partial x_w} \Big/ -\frac{\partial^2 \text{Pr}_k}{\partial x_k^2} > -1.$$

Minimum Wage

In representative democracies the minimum wage is determined by a political process that reflects the interest of the agent who proposes the pricing policy, the nature of the agent approving or rejecting the proposed policy and the pressures exerted by the capital owners and the workers' union on the second agent. In some cases the first agent is a professional civil servant and the second agent is the ruling politician. The professional office holder may propose a detailed policy in response to the request and possibly the guidelines of the ruling politician.¹³⁷ In other situations the policy is proposed by a politician (a Senator, a Parliament member) and the proposal needs to be approved by the legislature (the Senate, the Parliament).¹³⁸ Although our model can be applied to both situations, we henceforth adhere to the former interpretation referring to the agenda setter as a bureaucrat and to the agent approving or rejecting the proposed policy as the ruling politician. The bureaucrat whose objective function reflects his and the ruling politician's preferences is assumed to be a leading player.

Card and Krueger (1994), (1995) provide evidence showing that recent boosts in the minimum wage in the US have little or no effect on employment. An increase in the minimum wage increases the workers' income and reduces the capital owners' (the producers) profits. The minimum wage is thus a serious economic and political issue as claimed by Levin-Waldman

¹³⁷ In some instances the implementation of the proposed policy requires only the endorsement of the ruling politician (the relevant agent in the executive branch – the Prime Minister, the Minister of Finance, etc.). If, however, endorsement by the legislature is also required, then we have to assume that the ruling politician has a secured majority in the legislature that ensures its support in the economic policy the government proposes.

¹³⁸ For example, in October 1998, members of the US Senate (ruling politicians) defeated, in a 55-to-44 vote, a proposal to raise the federal minimum wage in two 50-cent increments to \$6.15 per hour. In this case the proposal put before the Senate was initiated by the administration. However, the Senate, not the executive branch, had the decision-making power.

(1998), see also references therein. In a recent paper Saint-Paul (1998) presented a general-equilibrium analysis of the impact of active labor-market policy on unemployment, wages and the welfare of the employees. The proposed framework is used to assess the extent of the political support of such policies and of the other parameters characterizing the economic environment. In particular, Saint-Paul shows that there may be political support for poor policies because the employed might have an interest in being sheltered from competition from the unemployed. Rama and Tabellini (1998) employ the common-agency approach to analyze the joint determination of product and labor-market distortions in a small open economy where capital owners and the workers' union lobby the government on both tariffs and minimum wage. Our endogenous policy determination approach differs from the ones mentioned above because we let the policy proposals depend on the efforts exerted by the different interest groups that try to influence the policy outcome in their favor, as well as on the political culture (the bureaucrat's objective function). This enables us to provide a theoretical rationalization to some of the observed relationships between the nature of the government and the level of the minimum wage.

The role of "politics" in the endogenous determination of public policy has been examined notably in the context of international-trade policy. Some workers have proposed a stylized nonstrategic political economic approach that is based on the assumption that the government maximizes some given political support function¹³⁹ that attaches different weights to the interest groups affected by the trade policy, see Hillman (1989, and references therein), Long and Vousden (1991) and Rodrik (1986). Magee, Brock and Young (1989) study a nonstrategic general-equilibrium framework in which trade policy is set by an elected politician. The interest groups make contributions that affect the probability that their preferred candidates are elected. In a more general setting, Appelbaum and Katz (1986) examine the endogenous determination of wage regulation in a game where the government is an active leading player who seeks rents by setting rents. More recently, Grossman and Helpman (1994) and Rama (1997) apply the common-agency model pioneered by Bernheim and Whinston (1986), viewing trade policy as the equilibrium outcome of a strategic game in which the interest groups affected by the trade policy act as principals, taking into account the influence of their contribution schemes on the agent who sets trade policy (the government).

In Chapter IV we proposed a two-stage political economic game where public policy is the outcome of the interaction between interest groups and a two-tier government. Using the framework developed in Chapter IV, the present chapter focuses on the endogenous determination of the minimum wage where the two interest groups are the workers' union and the capital owners that try to influence the decision of the ruling politician who approves

¹³⁹ The notion of political support function is related to the notions of "influence function" and "vote function", see van Winden (1999) and references therein.

or rejects the minimum wage proposed by the bureaucrat (typically a professional office holder). In this game the bureaucrat is assumed to be a leading player who operates subject to a political constraint: the rent-seeking rent-avoidance contest between the workers' union and the capital owners on the approval or rejection of his proposed minimum wage by the ruling politician.

In general, the proposed minimum wage differs from the utility-maximizing minimum wage of the workers' union. It can be *higher or lower* than this wage. We show that in our uncertain environment, the optimal minimum wage from the workers' viewpoint is always lower than the standard workers' utility-maximizing minimum wage under certainty. There exists a political culture that gives rise to the optimal uncertain minimum wage of the workers. The bureaucrat in such a case is more committed to the enhancement of the public well being than a bureaucrat whose equilibrium policy is the standard exogenously given union's utility-maximizing minimum wage under certainty.

1 The Contest

The first player in our game is a bureaucrat who sets and proposes the regulated minimum wage I . His proposal is approved or rejected by the ruling politician. Formally, the politician is not a player although he plays a central role through his possible effect on the bureaucrat's set of feasible policy proposals, through his influence on the objective function of the bureaucrat and, of course, through his direct effect on the realized outcome: the proposed or the status-quo minimum wage. The binary decision of the ruling politician affects the two remaining players: the capital owners and the workers' union. These players are engaged in a rent-seeking rent-avoidance contest, the contest on the approval or rejection of the bureaucrat's proposed minimum wage I .

The two players in the contest choose their strategies (outlays) given (a) the proposed minimum wage I and (b) the contest success function, CSF.

Let x_w and x_p denote the rent-seeking and rent-avoidance expenditures of the risk-neutral players: the workers' union (w) and the capital owners (p).¹⁴⁰ Viewing capital owners as a single agent implies that we disregard the process of interest-group formation and, in particular, the collective-action problems associated with it. With probability Pr_p the ruling politician rejects the proposed minimum wage I . That is, he approves the preferred status-quo minimum wage of the capital owners that, for convenience, we assume is equal to zero, implying that the capital owners are not subjected to any wage control. With probability Pr_w the ruling politician approves the proposed minimum wage I .

¹⁴⁰ In this chapter we assume standard rent-seeking efforts that improve the contestants' own performance, but ignore sabotage, that is, efforts that reduce the rival's performance, as in Konrad (2000).

The capital owners prefer that the minimum wage remains at zero. The preferred minimum wage of the workers' union is denoted by w^* . This minimum wage maximizes the payoff of the worker's union. The union is interested in a positive and sufficiently high minimum wage that, nevertheless, does not cause the unemployment rate to be too high. In other words, w^* is determined taking into account the awareness of the union to the effect of the wage on the unemployment level.

The expected net payoff (surplus) of the capital owners and the workers' union are, respectively, given by Eq. (A.2): $E(u_p) = A_p + \text{Pr}_p n_p - x_p$ and $E(u_w) = A_w + \text{Pr}_w n_w - x_w$ where A_p is the payoff (profits) of the capital owners when their preferred policy is not approved and n_p is their benefit (stake) from winning the contest, in which case the minimum wage is set at zero. A_w is the payoff of the workers' union when their preferred policy is not approved and n_w is its benefit (stake) from winning the contest (A_w is the workers' union's payoff at the status-quo minimum wage). Notice that when the policy is approved some workers may become unemployed. The stake n_w takes into account the aggregate utility of the workers and, in particular, the decrease in utility of those workers losing their jobs (if there are such workers) and the increase in the utility of those workers who earn a higher wage.

In the present study we assume that the outcome of the contest is determined by the *asymmetric* lottery CSF. That is, player i 's probability of success in competing against player j is given by¹⁴¹

$$\text{Pr}_w = \text{Pr}_w(x_w, x_p) = \frac{dx_w}{dx_w + x_p}, \quad \text{Pr}_p = 1 - \text{Pr}_w, x_w, x_p, d > 0, \quad (\text{E.48})$$

where $d > 0$ is a parameter representing either asymmetry in the contestants' lobbying ability or the bias of the politician in favor of or against the workers.

By our assumptions, both players participate in the contest. In a similar way to the analysis of the symmetric CSF presented in Part A, the conditions characterizing an interior equilibrium of the two-player contest (subgame) are¹⁴²

$$\frac{\partial E(u_p)}{\partial x_p} = \frac{dx_w}{(x_p + dx_w)^2} n_p - 1 = 0 \quad \text{and} \quad \frac{\partial E(u_w)}{\partial x_w} = \frac{dx_p}{(x_p + dx_w)^2} n_w - 1 = 0. \quad (\text{E.49})$$

The equilibrium expenditures and winning probabilities of the two players are given by

$$\begin{aligned} x_p^* &= \frac{dn_p^2 n_w}{(n_p + dn_w)^2}; \quad x_w^* = \frac{dn_w^2 n_p}{(n_p + dn_w)^2}, \\ \text{and} \quad \text{Pr}_p^* &= \frac{n_p}{n_p + dn_w}; \quad \text{Pr}_w^* = \frac{dn_w}{n_p + dn_w}. \end{aligned} \quad (\text{E.50})$$

¹⁴¹ We use this CSF for simplicity. The results are robust for the family of CSF that satisfy: $\text{Pr}_w(x_w, x_p) = \frac{dh(x_w)}{dh(x_w) + h(x_p)}$, where $\frac{\partial h(y)}{\partial y} > 0 \quad \forall y = x_m, x_p$.

¹⁴² The sufficient (second-order) conditions of such equilibria are satisfied.

By differentiating Eq. (E.50), we directly obtain that an increase in d increases (decreases) the expenditures of both players if $n_p - dn_w > 0$ ($n_p - dn_w < 0$). Moreover, an increase in d increases the probability that the workers' union wins the contest.

2 The Proposed Minimum Wage, Stakes, Efforts and Winning Probabilities

In a similar way to Eqs. (E.3) and (E.4) that use a symmetric CSF, the effect of a change in the proposed minimum wage I on the extent of the equilibrium expenditures of the two players is

$$\begin{aligned} \frac{\partial x_p^*}{\partial I} &= n_p n_w n'_p (n_p - dn_w) \left[\frac{\eta_w}{\eta_p} + 2 \frac{dn_w}{n_p - dn_w} \right] \frac{d}{(n_p + dn_w)^3}, \\ \text{and } \frac{\partial x_w^*}{\partial I} &= n_p n_w n'_w (dn_w - n_p) \left[\frac{\eta_p}{\eta_w} + 2 \frac{n_p}{dn_w - n_p} \right] \frac{d}{(n_p + dn_w)^3}, \end{aligned} \quad (\text{E.51})$$

where $\eta_j = \frac{\partial n_j}{\partial I} \frac{I}{n_j} = n'_j \frac{I}{n_j}$ is the elasticity of player j 's stake (benefit) with respect to a change in the proposed minimum wage I .

Note that, for $w^* > I > 0$, $\frac{\partial n_j}{\partial I} = n'_j > 0$, $\forall j = w, p$ and for $I > w^*$, $\frac{\partial n_w}{\partial I} < 0$ and $\frac{\partial n_p}{\partial I} > 0$. Also notice that there exists $\bar{w}$, such that the workers' union prefers a high minimum wage I that exceeds the optimal level w^* ($w^* < I < \bar{w}$) to having the status-quo zero minimum wage. On the other hand, a very high minimum wage I , ($I > \bar{w}$), is inferior to the status-quo zero minimum wage.¹⁴³

We can therefore conclude that the effect of an increase in the minimum wage on the contestants' outlays is unclear. This effect hinges on the elasticities of the contestants' stakes with respect to changes in the minimum wage. The effect of a change in the proposed minimum wage on the contestants' outlays also depends on the value of d . As can be seen from Eq. (E.51), the sign of the derivatives may change when the value of d is increased. Namely, an increase in the asymmetry or bias parameter d may reverse the effect a change of the minimum wage has on the expenditures of the two interest groups. From Eq. (E.50) (see also Eq. (B.5) for the symmetric case where $d = 1$),

$$\frac{\text{Pr}_p^*}{\text{Pr}_w^*} = \frac{1}{d} \frac{x_p^*}{x_w^*} = \frac{1}{d} \frac{n_p(I)}{n_w(I)}. \quad (\text{E.52})$$

¹⁴³ Notice that there may exist a minimum wage $I > \bar{w}$, such that the firms' profits are negative. In this case the workers' union is not interested in the approval of the proposed minimum wage and hence does not take part in the contest. The two potential contestants share the same objective, namely, that such a minimum wage is not approved. (We are grateful to Jan Svejnar for pointing out this possibility.)

Since

$$\frac{\partial (\text{Pr}_p^* / \text{Pr}_w^*)}{\partial I} = \frac{\partial (x_p^* / dx_w^*)}{\partial I} = \frac{1}{d} \frac{n_p(I)}{In_w(I)} (\eta_p - \eta_w), \quad (\text{E.53})$$

we obtain that: (a) If $w^* > I > 0$, then

$$\frac{\partial (\text{Pr}_p^* / \text{Pr}_w^*)}{\partial I} = \frac{\partial (x_p^* / x_w^*)}{\partial I} > 0 \quad \text{if} \quad \eta_p - \eta_w > 0.$$

Thus, the effect of a change in the proposed minimum wage on the capital owners' odds of winning the contest and on their relative investment in the contest is ambiguous and depends on the elasticities η_p and η_w . (b) If $\bar{w} > I > w^*$, a change in the proposed minimum wage I directly affects the capital owners' odds of winning the contest and their relative investment in the contest:

$$\frac{\partial (\text{Pr}_p^* / \text{Pr}_w^*)}{\partial I} = \frac{\partial (x_p^* / x_w^*)}{\partial I} > 0.$$

Consider, for example, an increase in the proposed minimum wage. In case (a) the effect of such a change that increases the stakes of the two contestants on their relative efforts and on their relative probabilities of winning the contest is ambiguous. These effects depend on the relationship between the elasticities η_p and η_w . If η_p exceeds η_w , then the union's odds of winning the contest (secure the approval of the proposed minimum wage) and its relative rent-seeking efforts increase with the increase in the proposed minimum wage. In case (b), the increase in the proposed wage reduces the stake of the workers' union but increases the capital owners' stake. In turn, the odds of the workers' union to win the contest and its relative efforts are reduced.

The total rent-seeking rent-avoidance outlays equals

$$X^* = x_w^* + x_p^* = \frac{dn_p(I)n_w(I)(n_w(I) + n_p(I))}{(dn_w(I) + n_p(I))^2}. \quad (\text{E.54})$$

By differentiating Eq. (E.54), we directly obtain that an increase in d increases (decreases) the total expenditures if $n_p - dn_w > 0$ ($n_p - dn_w < 0$). The effect of a change in the proposed minimum wage I on the total contestants' outlays is ambiguous.

$$\frac{\partial X^*}{\partial I} = d \frac{n_w n_p n'_w}{(n_p + dn_w)^3} (n_p - dn_w) \left(\frac{n_p}{n_w} - \frac{\eta_p}{\eta_w} + 2 \frac{n_p \left(\frac{\eta_p}{\eta_w} + 1 \right)}{(n_p - dn_w)} \right) \quad (\text{E.55})$$

For

$$d = 1, \quad \frac{\partial X^*}{\partial I} = \frac{n_w(I)n_p(I)n'_w(I)}{(n_p(I) + n_w(I))^2} \left(\frac{\eta_p}{\eta_w} + \frac{n_p(I)}{n_w(I)} \right).$$

The effect of a change in the minimum wage on the total outlays depends therefore on the value of d . More specifically,

Lemma E4: *The effect of a change in the minimum wage on the total outlays is unclear.*

In a symmetric game where $d = 1$ (see Proposition B1),

- a. *If $w^* > I > 0$, then $\frac{\partial X^*}{\partial I} > 0$.*
- b. *If $\bar{w} > I > w^*$, then $\frac{\partial X^*}{\partial I} < 0$ if $\frac{-\eta_p}{\eta_w} < \frac{n_p}{n_w}$.¹⁴⁴*

As explained by Proposition B1, in case (a) the effect of a change in the proposed minimum wage on the contestants' outlays is unequivocal. In particular, an increase in the proposed minimum wage induces larger total efforts. This result implies that even when such an increase induces the workers' union to reduce its rent-seeking efforts, this reduction is more than counterbalanced by the increase in the rent-avoidance efforts of the capital owners.

In case (b) the above lemma specifies the conditions that determine the effect of a change in the proposed minimum wage on the equilibrium total rent-seeking rent-avoidance outlays.

3 The Politically Constrained Bureaucrat

As in the public decision making setting studied in Chapter IV, the bureaucrat, who is typically a professional civil servant proposes the minimum wage I , possibly in response to the initiative of the ruling politician and subject to his guidelines that may affect the set of feasible proposals. As in Chapter IV, his objective function is given by $G(E(u_p); E(u_w); (x_p + x_w))$. $E(u_p)$ and $E(u_w)$ are the expected net payoffs of the capital owners and the workers' union. The contestants' outlays $(x_p + x_w)$ represent either transfers to the government (the ruling politician and/or the regulator) or resources wasted in the contest. We assume that the bureaucrat's objectives are represented by Eq. (B.8), which reflects his mixed commitments,

$$G(E(u_p); E(u_w); (x_p + x_w)) = \alpha g(\bar{E}(u_p^*) + \bar{E}(u_w^*)) + (1 - 2\alpha) f(x_p^* + x_w^*). \quad (\text{E.56})$$

The weight $(1 - 2\alpha)$ determines whether the second expression in the bureaucrat's objective function is a positive or a negative welfare component. A negative weight implies that the total rent-seeking rent-avoidance outlays are considered as wasteful resources. g and f are monotone increasing functions that specify the welfare corresponding to the aggregate expected benefit of the public and to the contestants' total expenditures. The parameters α and

¹⁴⁴ A sufficient condition for the total rent-seeking expenditures to be inversely related to I is that $\eta_p < -\eta_w$ and $n_p > n_w$.

$1 - 2\alpha$ are the weights assigned to the two welfare components. The bureaucrat's mixed commitments to the public and to the ruling politician are thus represented by α .

Note that since, $\bar{E}(u_l^*) = E(u_l^*) + x_l^*$, if $f(y) = g(y) = y$, then, and in Eq. (E.8), Eq. (E.56) can be written as

$$G(\cdot) = \alpha (E(u_p^*) + E(u_w^*)) + (1 - \alpha) (x_p^* + x_w^*) . \quad (\text{E.57})$$

In this form α and $1 - \alpha$ are the weights assigned, respectively, to the aggregate expected benefit and to the total contestants' outlays. For a more comprehensive discussion of α , see Chaps. IV. and XII.

4 The Equilibrium Minimum Wage

The bureaucrat maximizes his objective function by determining the optimal level of I . As shown by Eq. (B.10), the first-order condition is:

$$\frac{\partial G(\cdot)}{\partial I} = \alpha \frac{\partial g(\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial I} + (1 - 2\alpha) \frac{\partial f(X^*)}{\partial I} = 0, \quad (\text{E.58})$$

or,

$$\frac{\partial g(\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial (\bar{E}(u_p^*) + \bar{E}(u_w^*))} \frac{\partial (\bar{E}(u_p^*) + \bar{E}(u_w^*))}{\partial I} = - \frac{(1 - 2\alpha)}{\alpha} \frac{\partial f(X^*)}{\partial (X^*)} \frac{\partial (X^*)}{\partial I} . \quad (\text{E.59})$$

By Proposition B2, we obtain

Lemma E5: $\text{Sign} \left(\frac{\partial I^*}{\partial \alpha} \right) = -\text{Sign} \left(\frac{\partial X^*}{\partial I} \right) .$

Using Eq. (E.55), we can specify the conditions that determine the sign of $\left(\frac{\partial I^*}{\partial \alpha} \right)$.

In our extended game of minimum-wage determination I^* is the equilibrium minimum wage. However, from the viewpoint of the workers' union the optimal proposed minimum wage is the wage w_0 that maximizes its expected net payoff. We conclude this subsection by comparing w^* , I^* and w_0 and by examining the relationship between the political culture of the government and the outcome of this comparison. In particular, we are interested in the following two questions: (i) Can the political culture give rise to a minimum wage I^* that is equal to w^* ? (ii) Can the political culture give rise to a minimum wage I^* that is equal to w^0 , the workers' optimal wage level?

When $\alpha = 0$, the objective of the bureaucrat is to maximize the contestants' outlays disregarding the welfare of the public. Such an assumption implies an extreme political culture where the bureaucrat is totally committed to his and/or to the ruling politician's narrow interest of controlling the

resources expended by the contestants. The equilibrium minimum wage I^* maximizes $G(I) = f(X^*(I))$. Such a wage satisfies the first-order condition

$$\frac{\partial(f(X^*))}{\partial I} = \frac{\partial(f(X^*))}{\partial(X^*)} \frac{\partial(X^*)}{\partial I} = 0. \quad (\text{E.60})$$

Since $f(\cdot)$ is monotone increasing in (X^*) , Eq. (E.60) implies that in equilibrium $\frac{\partial(X^*)}{\partial I} = 0$. We thus obtain

Proposition E7:

- a. *There exists $d \in d_0, d_1$, ($d_0 < d_1$) and α_1 , such that $I^*(\alpha_1) = w^*$. If $d = 1$, then the condition for $I^*(\alpha_1) = w^*$ is: $\frac{-\eta_p}{\eta_w} < \frac{n_p(I)}{n_w(I)}$.*
- b. *There exists $d \in d_2, d_3$, ($d_2 < d_3$) and α_2 , such that $I^*(\alpha_2) > w^*$. If $d = 1$, then the condition for $I^*(\alpha_2) > w^*$ is: $\frac{-\eta_p}{\eta_w} > \frac{n_p(I)}{n_w(I)}$.*

This Proposition establishes that there exists a political culture that gives rise to the minimum wage w^* . It also specifies conditions that ensure that the proposed wage exceeds w^* . The emergence of the minimum wage w^* in our setting may require that α be positive, that is, that a positive weight be assigned by the government (the ruling politician and/or the bureaucrat) to the aggregate expected benefit of the public.

As mentioned above, if the workers' union wins the contest with certainty, then it prefers that the wage set by the bureaucrat be equal to w^* . This wage, which maximizes the union's benefit n_w , satisfies the equality: $\left. \frac{\partial n_w(I)}{\partial I} \right|_{I=w^*} = 0$. Since in our extended strategic setting the workers' union does not win the contest with certainty, it must take into account the possibility that an increase in its net benefit (by increasing I), may increase the opposition of the capital owners and that this may, in turn, reduce its probability of winning the contest. The union in our setting prefers that the minimum wage set by the bureaucrat will be w^0 – the wage that maximizes its expected net payoff in equilibrium. From the structure of the expected net payoff we obtain that in equilibrium

$$E(w_w^*) = A_w + \frac{(d^2 n_w(I))^3}{(n_p(I) + d n_w(I))^2}. \quad (\text{E.61})$$

The positive minimum wage level $I = w_0$ that maximizes $E(w_w^*)$ is characterized by the following first-order condition:

$$\frac{\partial E(w_w^*)}{\partial I} = d^2 \frac{3(n_w(I))^2 \frac{\partial n_w(I)}{\partial I}}{(n_p(I) + n_w(I))^2} - \frac{2(n_w(I))^3 \left(\frac{\partial n_w(I)}{\partial I} + \frac{\partial n_p(I)}{\partial I} \right)}{(n_p(I) + n_w(I))^3}. \quad (\text{E.62})$$

At $I^* = w^*$, $\frac{\partial n_w(I)}{\partial I} = 0$. Since, $\frac{\partial n_p(I)}{\partial I} > 0$ at w^* , $\frac{\partial E(u_w^*)}{\partial I} \Big|_{I=w^*} < 0$. This implies that the wage that maximizes the expected net payoff of the union is smaller than w^* . Thus, in a similar way to Lemma B2, we obtain,

Proposition E8:

- (a) $w^0 < w^*$.
- (b) *There exists α_3 , such that $I^*(\alpha_3) = w^0$.*

The bureaucrat who operates in a political culture that is represented by this positive α_3 is more committed to the enhancement of social welfare than a bureaucrat whose equilibrium policy is equal to w^* .

5 Implications

Our results highlight the significance of the political culture of the government (the bureaucrat and the ruling politicians) in the endogenous determination of the minimum wage. In particular, we examine the relationship between the parameter that represents the political culture (the degree of politicization of the government) and the contestants' stakes and the rent-seeking rent-avoidance efforts of the interest groups affected by the proposed minimum wage and their probability of winning the contest on the approval of the proposed policy.

In our extended strategic setting, where the professional bureaucrat is a leading player who sets the minimum wage subject to a political contest (the contest on the approval of his proposal), the equilibrium minimum wage usually differs from the level that maximizes the certain payoff of the workers' union. The most preferred wage from the union's viewpoint is always lower than that level. We show that a political culture that assigns a positive weight to the public well being can give rise to an equilibrium minimum wage that exceeds both levels, namely the levels that maximize the workers' payoff under uncertainty as well as under certainty.

Empirical investigations demonstrated that the determinants of labor market rigidities and their underlying institutional regulation are the outcome of political influence of incumbent employees, Saint-Paul (1996). In particular, the existence of a right-wing government slows down the growth rate of the minimum wage. Our analysis provides a theoretical rationalization to this latter observation, provided that the political-culture parameter α is interpreted to represent the nature of the government (its location on the spectrum ranging between extreme left and right wing). In light of the Propositions presented above, to some extent we could identify the degree of politicization of the bureaucrats and the ruling politicians in different countries. This degree is determined by α , the weight assigned to the aggregate public welfare. As α decreases, the degree of politicization increases, i.e. a larger weight is

assigned to the positive transfers reaching the ruling politicians. Our results establish the relationship between α and the proposed minimum wage. The minimum wages proposed in different countries reflect the revealed preferences of the bureaucrats and the ruling politicians in these environments. One can therefore estimate the values of the parameter α that represent the degree of politicization of the government in different countries using the data on the proposed minimum wages. In the symmetric case where $d = 1$, it is clear that an increase in the minimum wage is associated with an increase in the degree of politicization. If, for instance, the proposed minimum wages in three countries are $w^0 = I^*(\alpha_3)$, $w^* = I^*(\alpha_1)$ and $w^+ = I^*(\alpha_2)$, ($w^0 < w^* < w^+$), then, by Propositions E7 and E8, $\alpha_3 > \alpha_1 > \alpha_2$. To sum up, the degree of politicization of different governments can be inferred from observations on the proposed minimum wages.

In developing our analytical framework, we made some simplifying assumptions (for example, regarding the CSF and the status-quo minimum wage) that enabled us to focus on the new elements of our extended political economic game of the endogenous minimum-wage determination. Our main results are, nevertheless, robust, i.e. they can be established under more general assumptions regarding the CSF or the status-quo payoff of the workers.

Tournaments

The well-established tournament literature demonstrates that it might be optimal for a principal to create a tournament when he does not have complete information regarding the employees' productivity. Workers compete in tournaments for promotion and the most productive one is promoted to the higher rung of the firm. Lazear and Rosen (1981), Rosen (1986), Gibbs (1989), Lazear (1996) and others,¹⁴⁵ in papers based on a similar approach, investigated the incentives of prizes that enhance survival in sequential elimination tournaments that result in the selection of the most highly qualified contestant. Success is based on "survival of the fittest", which maintains "quality of play" as the game progresses. Their models identify the unique role of top-ranking prizes in maintaining performance incentives in career and other survival games and, in particular, in encouraging competitors to aspire to further heights, regardless of past achievements. Carmichael (1983), Malcomson (1984) and others show that one of the benefits of tournaments is that it provides appropriate incentives for the supervisor to reward employees. The rationale of a tournament is thus based on its ability to induce the most productive worker to reveal himself-via production.¹⁴⁶ Note that there could be other reasons for creating a tournament. In fact, much of the early literature on tournaments abstracted entirely from ability differences between workers. Tournaments were rationalized (a) as a way of achieving identical effort levels to those achieved by efficient piece rates, but with less information (only ranking information is required), and (b) with a different, and sometimes preferable risk profile (only two wage outcomes are possible rather than a continuum; pay is not affected by common shocks to the contest participants).

¹⁴⁵ The vast recent tournament literature deals with different aspects of tournaments. However, the basic rationalization for the existence of tournaments is similar to the one proposed in the earlier tournament literature cited above.

¹⁴⁶ Although this may be one possible rationale for tournaments, high-productivity workers generally have lots of other good incentives to reveal themselves to employers; see the literature on "career concerns" in agency models.

In order to emphasize our point, we take an extreme point of view and consider a fully informed principal whose employees are working at their highest capability. The principal's objective is to maximize a weighted average of two (endogenous) variables; the profitability (productivity) level of his team and the promotion efforts incurred by his employees. The principal is assumed to be a manager of a department or of the firm, but not the owner. Our preliminary and main argument is that under such circumstances the principal may have an incentive to create a promotion tournament, despite the fact that he is completely informed about the productivity of his workers. In other words, the principal benefits from the promotion effort invested by the workers. The principal therefore managers the employees to participate in a contest that generates rents for himself. If the objective is to extract rents from workers, one could wonder why go to the bother of setting up a contest? Presumably, if the manager has hiring and firing authority, he can just auction off jobs to the highest bidder, thus extracting all the workers' rents without any efficiency loss due to wasted efforts in a tournament. However, this would create a problem for the manager as the share holders may see this negatively. When creating a tournament, he gives rise to a principal-agent problem between the share holders and himself and this solves his problem with the shareholders. In order to emphasize our results, we focus on the extreme type of a tournament where the principal's sole purpose is to extract promotion efforts from the workers. In a more realistic setting the tournament is formed to extract productive as well as nonproductive promotion efforts. Under such a more general tournament, it would be very hard for the share holders to detect such activities by the manager.

The first result and its corollaries clarify the required conditions for the rationalization of a promotion tournament in our setting. The main idea behind the proposed tournament rationalization is that it induces the workers to invest effort in promotion-seeking activities that are aimed at and are appreciated by the principal.^{147,148} One could interpret these activities as "influence costs" (see Tullock, 1967, Lockard and Tullock, 2001 and references therein and Milgrom and Robert, 1992), namely, the costs implied by attempts to influence others' decisions in a self-interested fashion, by attempts to counter such influence activities by others, and by the degradation of the quality of decisions because of such effective influence.

¹⁴⁷ The crucial point in the interpretation of the tournament in our setting is that the action of the employer is perceived as random by his employees. The perceived randomness could arise because the employees do not know the true preferences of the employer, or because there are other nonforeseeable factors that may impact on the employee's decision. According to this interpretation our assumption that the employer controls the CSF implies that he can transmit information or send signals that effectively determine the perception of the employees regarding the form of his random behavior.

¹⁴⁸ Our setting is also amenable to the alternative interpretation where the principal encourages corruption by promising to reward less-competent employees.

The firm often has a typical pyramidal structure: the number of employees decline at higher levels of the internal hierarchy and only one incumbent is situated at the top-level of the hierarchy. Internal tournaments that determine the promoted employees take place on each rung of the firm. A substantial literature has been concerned with the question of how managers advance via competition through the ranks of the firm (see, for example, Beckmann, 1978). A career path is typically the outcome of competition among peers with the objective of attaining higher rungs and, correspondingly, more remunerative positions during the life cycle. Successful contestants seek more prosperity and occupy themselves with winning further promotion at the expense of production. In the existing literature this is possible because of the ambiguities of measuring the individual's contribution to output (see Radner 1993). In the current chapter, it is shown that even under the extreme situation of no ambiguity regarding the workers' contribution to output, the management practice of holding a promotion tournament can be rationalized.

The analysis in our setting focuses on the effect of the employees' productivity on the probability of their promotion and on the extent of the resources wasted in the tournament. These resources can be viewed as another form of rent-seeking activities examined in the voluminous literature since Tullock's (1967) seminal paper. In particular, we specify the conditions that ensure that the most productive employee in the team (the natural candidate for promotion) is less likely to be promoted and the conditions under which increased employee's productivity results in increased wasted promotion efforts. In the former case, since the employees differ in productivity (in production and in affecting promotion), the existing incentives in the firm, which are partly determined by the competitive market environment and partly by the principal, can result in senior management that is more likely to be dominated by low-productivity individuals. In the latter case, given the existing incentives in the firm, increased productivity may result in more intense competition in the promotion contest and, in turn, in increased wasteful promotion-seeking activities.

1 Promotion Tournaments: The Rationale

Suppose that two risk-neutral employees seek to maximize expected income over two periods. The firm of these employees has two hierarchical levels.¹⁴⁹ A principal/supervisor who has complete knowledge¹⁵⁰ of the workers' productivity must determine which of the workers to promote. In the first period

¹⁴⁹ Our results can be generalized to a larger number of rungs within a firm where the number of contestants (employees) in a tournament declines while climbing the rungs of the firm's ladder.

¹⁵⁰ The assumption that the principal has complete knowledge is made in order to accentuate our results.

both workers are on the first rung while in the second period only one of them is promoted to the second rung and the other one remains on the first rung.

The productivity of worker i is denoted by v_i ($i = 1, 2$). v_i specifies the absolute productive efficiency per unit of time. To simplify the analysis, we assume that a worker's earnings are given by a linear function of his productivity, i.e. his added value to the firm.¹⁵¹ The productivity of a worker on the second rung is denoted by p_i ($i = 1, 2$). With no loss of generality, let worker 1 be more productive than worker 2:

$v_1 > v_2$ and $p_1 > p_2$. The increase in a worker's productivity due to promotion is equal to $p_i - v_i$. The increase in productivity is assumed to be higher for the more productive worker, i.e. $p_1 - v_1 > p_2 - v_2$. Without this assumption, promotion of the less productive worker could be plausible because it results in increased profitability.¹⁵²

If the principal wishes to maximize the total productivity of his team or its total profit, then, clearly, he would choose to promote the most productive worker. In such a case the principal does not create a contest and he is aware of the exact productivity/profit of the firm that corresponds to the promotion of the productive worker. Thus, the productivity/profit of the team in the two periods is:^{153, 154}

$$v_1 + p_1 + 2v_2. \quad (\text{E.63})$$

In order to emphasize our results, we consider the extreme case where the fully informed principal is interested in creating a contest between the two workers. In this promotion contest the winner is determined by a contest success function. This function transforms the promotion-seeking efforts and the productivities of the employees into their promotion probabilities. If the objective is to extract rents from workers, one could wonder why go to the bother of setting up a contest? Presumably, if the manager has hiring and firing authority, he can just auction off jobs to the highest bidder, thus extracting all the workers' rents without any efficiency loss due to wasted effort in a tournament. However, this would create a problem for the manager as the share holders may see this negatively. When creating a tournament, he gives rise to a principal-agent problem between the share holders and himself. In order to emphasize our results, we focus on the extreme type of a tournament where the principal's sole purpose is to extract promotion efforts from the workers. In a more realistic setting, the tournament is formed to extract productive

¹⁵¹ The results remain valid when the worker is assumed to earn some proportion of his contribution to the firm's profits and not his total contribution.

¹⁵² The main results would not change, however, if this assumption is relaxed.

¹⁵³ To simplify the analysis, we assume that the discount factor is equal to 1.

¹⁵⁴ If the worker obtains δ , $0 < \delta < 1$, of his contribution and the firm obtains the remaining proportion $(1 - \delta)$, then the firm's profits are equal to $(1 - \delta)(v_1 + p_1 + 2v_2)$. Notice, however, that maximization of $(1 - \delta)(w_1 + p_1 + 2w_2)$ and $(w_1 + p_1 + 2w_2)$ are equivalent. We therefore disregard δ in our calculations.

as well as nonproductive promotion efforts. Under such more general tournament, it would be very hard for the share holders to detect such activities by the manager.

Each individual has an endowment of time, normalized to unity, which is allocated to productive and promotion-seeking activities. The promotion-seeking activities are targeted at the principal. A_i and L_i denote, respectively, the time allocated to these activities. That is,

$$A_i + L_i = 1. \quad (\text{E.64})$$

In the first period the worker's contribution to the firm is equal to:¹⁵⁵

$$I_i = v_i (1 - L_i). \quad (\text{E.65})$$

Let Pr_1 be the probability that worker 1 wins the contest and, consequently, in the second period, has a productivity of p_1 (v_1) (henceforth p_1). For simplicity, we assume that if the worker loses the contest he works for one more period and does not compete during the second period. With probability $(1 - \text{Pr}_1)$ the worker loses the contest and therefore his productivity in the second period is equal to v_1 . Although the principal creates a contest between the workers, he is not aware of the actual outcome of the contest, that is, the principal does not know which of the workers is going to be promoted. Our analysis is thus based on the assumption that the principal shares with the employees the uncertainty regarding the contest outcome. Creating a contest implies that the principal and the workers are uncertain about the identity of the promoted worker (the winner in the contest).¹⁵⁶ This is the reason why the principal's utility derives from the workers' expected contribution to the firm's output. Making a decision whether to create a contest or not, the principal therefore compares the expected firm's output under the contest with its output in a situation where there is no contest at all. The expected contribution of worker i to the firm's output is given by:

$$E(I_i) = v_i(1 - L_i) + v_i(1 - \text{Pr}_i) + p_i\text{Pr}_i = v_i(2 - L_i) + (p_i - v_i)\text{Pr}_i. \quad (\text{E.66})$$

In our setting the principal's utility hinges on both profitability and the employees' promotion-seeking activities. The promotion-seeking activities may benefit the principle because they can take the form of direct or indirect resources transferred to him or for example, various forms of activities that affect his status and self-esteem.¹⁵⁷ The principal therefore maximizes a weighted

¹⁵⁵ We disregard incentives of workers to sabotage each other (Lazear, 1989).

¹⁵⁶ The principal may intentionally limit his intervention to a single input into the promotion process by, for example, writing a performance evaluation on both workers, realizing that these evaluations are only part of the package that gets evaluated in the promotion process for employees. This also justifies the assumption that he himself is uncertain about the contest winner.

¹⁵⁷ For a related analysis in the context of rent-seeking and public policy, see Epstein and Nitzan (2006b and see Part C Chapter IV).

average of the profitability (productivity) level of his team and of the sum of the employees' promotion-seeking efforts. His objective function is thus given by:

$$S(\cdot) = \alpha (E(I_1) + E(I_2)) + (1 - \alpha) (v_1 L_1 + v_2 L_2) , \quad (\text{E.67})$$

where $(v_1 L_1 + v_2 L_2)$ is the value of the promotion-seeking activities.

If the principal does not create a contest and promotes the more productive worker, then the value of his objective function is $\alpha (v_1 + p_1 + 2v_2)$. The principal has an incentive to create a contest, if and only if ¹⁵⁸

$$\alpha (E(I_1) + E(I_2)) + (1 - \alpha) (v_1 L_1 + v_2 L_2) > \alpha (v_1 + p_1 + 2v_2) , \quad (\text{E.68})$$

or,

$$\alpha (\text{Pr}_1 (p_1 - v_1) + \text{Pr}_2 (p_2 - v_2)) + (1 - 2\alpha) (v_1 L_1 + v_2 L_2) > \alpha (p_1 - v_1) . \quad (\text{E.69})$$

Inequality Eq. (E.68) therefore holds iff

$$\frac{(1 - 2\alpha)}{\alpha} \frac{(v_1 L_1 + v_2 L_2)}{\text{Pr}_2} > (p_1 - v_1) - (p_2 - v_2) . \quad (\text{E.70})$$

Note that $p_i - v_i$ is the increase in the team's productivity corresponding to the promotion of worker i . Whether this condition is satisfied or not hinges on the contest success function (CSF), on the parameters p_i and v_i , on the weights α and $1 - \alpha$ assigned by the principal to his two utility components and, in turn, on the resulting equilibrium promotion-seeking activities of the contestants $v_1 L_1 + v_2 L_2$ and, therefore, on their contest-winning probabilities Pr_1 and Pr_2 . Since $p_1 - v_1 > p_2 - v_2$, given the CSF and the three parameters, the above condition is satisfied if the promotion-seeking activities of the workers are sufficiently large or the contest-winning probability of worker 2 is sufficiently low. This simple condition has the following straightforward implications regarding the effect of the parameters:

- (i) Inequality Eq. (E.70) requires that $\alpha < 0.5$. That is, a necessary condition for the existence of an effective incentive for a principal to create a tournament is that the weight he assigns to the productivity of the team is lower than the weight assigned to the contestants' promotion-seeking activities, $\alpha < 0.5$. More generally, Eq. (E.70) highlights which parameter values of $(1 - \alpha)$ rationalize the tournament, viz., make the creation of the tournament the preferred option for the principal. A sufficiently low level of this parameter implies that a tournament is irrational. In such a case the principal would not bother to create a tournament. If $(1 - \alpha)$ is sufficiently high, namely, the principal assigns a sufficiently

¹⁵⁸ For "optimal contest design" in the different context of research and labor tournaments that focus on the adverse selection problem associated with the selection of the most highly qualified contestants in auctions, see Fullerton and McAfee (1999) and the references therein.

high weight to the contestants' promotion-seeking activities, then it is sensible for him to create a tournament and act randomly in determining which of the workers to promote. A rational principal who only cares about the profitability of his team will never choose to create such a promotion tournament. If he cares just about extracting tangible rents for himself, that is, if $(1 - \alpha) = 1$, then creating a tournament is his preferred alternative.¹⁵⁹

- (ii) If the tournament is symmetric in terms of the worker' productivities: $p_1 - v_1 = p_2 - v_2$ and $\alpha < 0.5$, then the principal always prefers to create a tournament rather than promote with certainty the (known) more productive worker. The reason for this is that when both workers are identical, $\Pr_1 (p_1 - v_1) + \Pr_2 (p_2 - v_2) = p - v$. This means that the principal always gains $\alpha (p - v)$, regardless of who wins the promotion contest. In such a case any tournament that generates positive promotion-seeking efforts is preferred to the "no contest" alternative, provided that the weight assigned to the workers' promotion-seeking efforts is larger than the weight assigned to the profitability of the firm.
- (iii) The preference of a tournament requires the existence of contest equilibrium. In the case of a pure strategy equilibrium, the following first- and second-order existence conditions, $\frac{\partial \Pr_i}{\partial (v_i L_i)} > 0$, $\frac{\partial \Pr_i}{\partial (v_j L_j)} < 0$ and $\frac{\partial^2 \Pr_i}{\partial (v_i L_i)^2} < 0$ are also required for the principal to prefer the seemingly ad hoc random behavior according to the CSF. Notice that these conditions also ensure that as the effect of promotion on a worker's productivity, $p_1 - v_1$, is increased, his promotion-seeking effort as well as his expected payoff are increased.¹⁶⁰

¹⁵⁹ In the absence of perfect information, this restriction may be substantially weakened. We do not delve, however, into this line of inquiry.

¹⁶⁰ To ensure that the equilibrium is a pure strategy Nash equilibrium and that it is unique, in addition to the assumed properties of the CSF, we have to add the following requirement:

$$\Pr_i (1 - \Pr_i) \frac{\partial^2 \Pr_i}{\partial (v_i L_i) \partial (v_j L_j)} + (2\Pr_i - 1) \frac{\partial \Pr_i}{\partial (v_i L_i)} \frac{\partial \Pr_i}{\partial (v_j L_j)} = 0.$$

This condition is satisfied if $\frac{\partial^2 \Pr_i}{\partial (v_j L_j) \partial (v_i L_i)} \begin{matrix} > \\ < \end{matrix} 0$ iff $\Pr_i = 0.5$. This plausible as-

sumption means that worker i has an advantage in terms of ability, if a change in j 's effort positively affects his marginal winning probability. In other words, a positive (negative) sign of the cross second-order partial derivative of $\Pr_i$, $\frac{\partial^2 \Pr_i}{\partial (v_j L_j) \partial (v_i L_i)}$, implies that i has an advantage (disadvantage) when j 's effort changes. Note that this assumption is satisfied by many contest success functions that have been studied in the contest literature.

For $\alpha < 1/3$,¹⁶¹ which satisfies the necessary condition for the rationalization of the tournament, let us consider the following simple contest success function: $\text{Pr}_i(\cdot) = \frac{L_i v_i}{L_i v_i + L_j v_j} \quad \forall i \neq j, i, j = 1, 2$. Under this CSF, in equilibrium, $L_i^* = \frac{1}{v_i} \frac{(p_j - v_j)(p_i - v_i)^2}{((p_i - v_i) + (p_j - v_j))^2}$ and $\text{Pr}_i^*(\cdot) = \frac{(p_i - v_i)}{(p_i - v_i) + (p_j - v_j)}$. Hence, in equilibrium, the ratio $\frac{(v_1 L_1^* + v_2 L_2^*)}{\text{Pr}_2^*}$ is equal to $p_1 - v_1$. Consequently, in this case $\alpha < \frac{1}{3}$, which implies that $\frac{(1-2\alpha)}{\alpha} > 1$ is also a sufficient condition for the rationalization of the promotion tournament (see inequality (E.70)). In other words, if the principal's objective function is characterized by $\alpha < 1/3$, then he prefers a tournament based on the assumed contest success function to no tournament (certain promotion of the more productive employee).

2 Productivity and Promotion

Let us now examine the relationship between a worker's productivity and his probability of being promoted, i.e. of winning the tournament. What we wish to consider here is how changes in the worker's productivity affect his probability of promotion and the total amount of effort devoted to this contest. One could think of this analysis as focusing on the effect of replacing one worker with a more/less efficient one on the promotion probability and on the workers' exerted efforts. Notice that allocating more time to promotion-seeking activities as a result of a change in the worker's productivity is henceforth referred to as an increase of investment in the tournament or as a reduction in the productive activities. Let us turn to the comparative statics analysis with respect to the productivity of the worker.

The objective of the workers is to maximize their expected income by determining the level of investment in promotion-seeking activities.¹⁶² The equilibrium expected income is determined by the Nash equilibrium promotion-seeking efforts of the workers. The interior tournament equilibrium efforts L_1^* and L_2^* are characterized by the following equalities:

$$G_i = \frac{\partial E(I_i)}{\partial L_i} = -v_i + (p_i - v_i) \frac{\partial \text{Pr}_i}{\partial (v_i L_i)} v_i = 0, \quad \forall i = 1, 2. \quad (\text{E.71})$$

The contest success function is assumed to satisfy the following plausible requirements (see (iii) in the preceding section): $\frac{\partial \text{Pr}_i}{\partial (v_i L_i)} > 0$, $\frac{\partial \text{Pr}_i}{\partial (v_j L_j)} < 0$ and $\left(\frac{\partial^2 \text{Pr}_i}{\partial (v_i L_i)^2} < 0 \right)$. It can be verified that these conditions are sufficient for the existence of tournament equilibrium.

¹⁶¹ The LHS of (E.69) is given by: $\alpha (\text{Pr}_1 (p_1 - v_1) + \text{Pr}_2 (p_2 - v_2)) + (1 - 2\alpha) (v_1 L_1 + v_2 L_2)$. $\alpha < 1/3$ satisfies the inequality $\frac{(1-2\alpha)}{\alpha} > 1$, where the weight α assigned to the expected increase in the team's productivity $\text{Pr}_1 (p_1 - v_1) + \text{Pr}_2 (p_2 - v_2)$ is smaller than the weight $1 - 2\alpha$ assigned to the promotion-seeking activities $v_1 L_1 + v_2 L_2$.

¹⁶² Recall that in our calculations δ is disregarded.

By the first-order conditions Eq. (E.71), the marginal effect of a unit of investment in promotion-seeking activities on the probability of promotion is equal to:

$$\frac{\partial \text{Pr}_i}{\partial (v_i L_i)} = \frac{1}{(p_i - v_i)}, \quad \forall i = 1, 2, \quad (\text{E.72})$$

and the equilibrium workers' investment in promotion-seeking activities satisfy the following equalities:

$$\frac{\partial L_i}{\partial v_i} = \frac{\frac{\partial G_i}{\partial L_j} \frac{\partial G_j}{\partial v_i} - \frac{\partial G_j}{\partial L_i} \frac{\partial G_i}{\partial v_i}}{\frac{\partial G_i}{\partial L_i} \frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i} \frac{\partial G_i}{\partial L_j}} \quad \text{and} \quad \frac{\partial L_i}{\partial v_j} = \frac{\frac{\partial G_i}{\partial L_j} \frac{\partial G_j}{\partial v_j} - \frac{\partial G_j}{\partial L_j} \frac{\partial G_i}{\partial v_j}}{\frac{\partial G_i}{\partial L_i} \frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i} \frac{\partial G_i}{\partial L_j}} \quad i, j = 1, 2. \quad (\text{E.73})$$

The ability of a contestant j to convert effort into probability of winning the tournament can be represented by the marginal effect of a change in his effort on his winning probability. By assumption, this marginal effect is declining with his own effort. A change in his effort also affects, however, the marginal winning probability of his rival i . The rival i has an advantage in terms of ability if a change in j 's effort positively affects his marginal winning probability. In other words, a positive (negative) sign of the cross second-order partial derivative of Pr_i , $\frac{\partial^2 \text{Pr}_i}{\partial (L_i v_i) \partial (L_j v_j)}$, implies that i has an advantage (disadvantage) when j 's effort changes. At some given combination of efforts $(L_i v_i, L_j v_j)$, the ratio between the effect of a change in j 's effort on the marginal winning probability of i and the effect of a change in j 's effort on his own ability, $\frac{\partial^2 \text{Pr}_i}{\partial (L_i v_i) \partial (L_j v_j)} \bigg/ \left(\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} \right)$, is therefore a local measure of the asymmetry between the abilities of i and j . This asymmetry in the equilibrium ability to affect the outcome of the tournament can reflect the higher productivity of a worker, that is, his greater efficiency of turning effort into his probability of winning the tournament or the principal's preferences, that is, his bias in favor of one of the workers. This asymmetry together with two types of payoff-asymmetry that are presented below play a crucial role in determining the comparative statics effects on which this section focuses.

The questions we would like to pose at this stage are what happens to the promotion-seeking efforts of the workers, to the total loss in the productivity of the team and to a worker's probability of promotion when one of the workers is replaced by a more productive one. Let us first calculate the effect of a change in v_i (a change in the productivity of a worker on the first rung) on the time allocated to promotion-seeking activities by him and by his rival, $\frac{\partial L_i}{\partial v_i}$ and $\frac{\partial L_j}{\partial v_i}$. Denote by η_i the elasticity of the increase in worker i 's productivity (his added value to the firm) due to his promotion, $\eta_i = \frac{\partial (p_i - v_i)}{\partial v_i} \frac{v_i}{p_i - v_i}$. By assumption, η_i is positive, i.e. promotion positively affects the worker's productivity.

Let

$$D = (p_i - v_i)(p_j - v_j)v_jv_i \left(\frac{\partial^2 \text{Pr}_j}{\partial (L_i v_i)^2} \frac{\partial^2 \text{Pr}_i}{\partial (L_i v_i)^2} - \frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j) \partial (L_i v_i)} \frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)} \right). \quad (\text{E.74})$$

Note that since

$$\text{Pr}_i + \text{Pr}_j = 1, \quad \frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j) \partial (L_i v_i)} = - \frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)}$$

and, therefore, $D > 0$. From Eqs. (E.72) and (E.73),

$$\frac{\partial L_i^*}{\partial v_i} = - \frac{L_i}{v_i} \left(1 + \frac{(p_j - v_j)v_j}{DL_i} \frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} \eta_i \right), \quad i \neq j, \quad i, j = 1, 2. \quad (\text{E.75})$$

Since $-\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} > 0$, we obtain that,

- (iv) Higher productivity of worker i increases his promotion-seeking effort, if the elasticity of the promotion effect on productivity is sufficiently large, specifically, if $\eta_i > \frac{1}{\frac{(p_j - v_j)v_j}{DL_i} \left(-\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} \right)}$.

An increase in a worker's productivity raises his (alternative) cost of participation in the tournament. To induce the worker to invest in the tournament, his reward in the case of winning must be sufficiently large. As worker i 's rival becomes more productive, $(p_j - v_j)$ and v_j are increased, the lower bound of the elasticity (ensuring that the worker increases his investment in the tournament) declines.

The effect of an increase in the productivity of worker i on the promotion-seeking effort of worker j is given by:

$$\frac{\partial L_j^*}{\partial v_i} = \frac{(p_j - v_j)}{D} \frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j) \partial (L_i v_i)} \eta_i, \quad i \neq j, \quad i, j = 1, 2. \quad (\text{E.76})$$

Note that the sign of the cross-partial derivative is (very likely to be) different between the two workers of different productivities. We therefore obtain that,

- (v) $\frac{\partial L_i^*}{\partial v_j}$ is positive (negative) iff $\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j) \partial (L_i v_i)}$ is positive (negative).

In a symmetric contest where $\text{Pr}_i(L_i v_i, L_j v_j) = 1 - \text{Pr}_i(L_j v_j, L_i v_i)$ and $v_i > v_j$, $\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j) \partial (L_i v_i)} < 0$. If player j has a disadvantage (advantage) in terms of his equilibrium ability (marginal winning probability), that is, $\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j) \partial (L_i v_i)} < 0$ (> 0), then an increase in worker i 's productivity increases the disadvantage (advantage) of worker j and this induces him to reduce his investment in the tournament.

The probability that the more productive worker is promoted is

$$\frac{d\text{Pr}_i}{dv_i} = \frac{\partial \text{Pr}_i}{\partial v_i} + \frac{\partial \text{Pr}_i}{\partial L_i} \frac{\partial L_i}{\partial v_i} + \frac{\partial \text{Pr}_i}{\partial L_j} \frac{\partial L_j}{\partial v_i}. \quad (\text{E.77})$$

Using Eqs. (E.73)–(E.77) we obtain that

$$\frac{d\text{Pr}_i^*}{dv_i} = \eta_i \frac{v_j}{D} \left[\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)} - \frac{p_j - v_j}{p_i - v_i} \frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} \right]. \quad (\text{E.78})$$

We therefore get that,

$$(\text{vi}) \text{ For } \eta_i > 0, \frac{d\text{Pr}_i^*}{dv_i} \begin{matrix} > \\ = \\ < \end{matrix} 0 \text{ iff } \frac{\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)}}{\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2}} \begin{matrix} < \\ = \\ > \end{matrix} \frac{p_j - v_j}{p_i - v_i}.$$

This result establishes that the effect of productivity on worker i 's probability of promotion hinges on the relationship between the local measure of asymmetry between the abilities of i and j ,

$$\frac{\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)}}{\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2}}$$

and the asymmetry between the contestants' promotion benefits, $\frac{p_j - v_j}{p_i - v_i}$. If $\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)} > 0$, that is, if worker i has an advantage over worker j in terms of his equilibrium ability to affect the tournament outcome, since, by assumption, $\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} < 0$, the local measure of the asymmetry between the abilities of i and j is negative,

$$\frac{\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)}}{\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2}} < 0.$$

In such a case as worker i becomes more productive, his probability of winning the promotion is increased. However, if worker j has an advantage over worker i in terms of his equilibrium ability to affect the outcome of the tournament,

that is, if $\frac{\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)}}{\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2}} > 0$, then it is not clear whether worker i 's probability

of promotion is increased. This depends on the symmetry between the contestants' promotion benefits, $\frac{p_j - v_j}{p_i - v_i}$. On the one hand, an increase in v_i decreases the advantage j has over i . On the other hand, however, worker i 's alternative cost of participation in the tournament is increased. The overall effect on worker i 's incentive to invest in the tournament is therefore ambiguous.

Finally, let us consider the effect of a change in the productivity of worker i on the productivity of the team, $v_i L_i^* + v_j L_j^*$. Using Eqs. (E.71)–(E.76) we obtain that,

$$\frac{\partial (v_i L_i^* + v_j L_j^*)}{\partial v_i} = \frac{(p_j - v_j) v_j \eta_i}{D} \left[-\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} - \frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)} \right]. \quad (\text{E.79})$$

Hence,

$$(\text{vii}) \quad \text{For } \eta_i > 0, \quad \frac{\partial (v_i L_i^* + v_j L_j^*)}{\partial v_i} > 0 \text{ iff } \frac{\frac{\partial^2 \text{Pr}_i^*}{\partial (L_j v_j) \partial (L_i v_i)}}{\frac{\partial^2 \text{Pr}_j^*}{\partial (L_j v_j)^2}} = 1.$$

By this result, since, $\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2} < 0$, if worker i has a disadvantage in terms of his equilibrium ability to affect his probability of promotion, that is, if $\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)} < 0$, then an increase in worker i 's productivity reduces his disadvantage and the total amount of resources invested in the tournament is increased. On the other hand, if worker i has an advantage in terms of his equilibrium ability to affect his probability of promotion, that is, if $\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)} > 0$, then an increase in worker i 's productivity that further increases his advantage may reduce the total investment in the tournament. Whether the resources invested in the tournament are increased or decreased depends on whether the value of the local measure of the asymmetry between the abilities of i and j , $\frac{\frac{\partial^2 \text{Pr}_i}{\partial (L_j v_j) \partial (L_i v_i)}}{\frac{\partial^2 \text{Pr}_j}{\partial (L_j v_j)^2}}$ is larger or smaller than unity. In other words, this condition

establishes that total effort is increased (decreased), if a change in j 's effort has a stronger (weaker) effect on the marginal promotion probability of worker i than on his own marginal probability of securing promotion. An alternative way of looking at this result is to consider the question: how does an increase in the variance of the productivity in the team (an increase in v_1 or a decrease in v_2) affect the total effort invested in the promotion tournament. By (viii), an increase in the productivity variance increases the total effort invested in the contest, if there is a sufficient asymmetry between the workers' abilities to affect the probability of promotion.

We conclude the comparative statics analysis with the following two special cases of zero and negative elasticities:

a. When $\eta_i = 0$, the increases in productivity in both rungs are identical, that is, $\frac{\partial p_i}{\partial v_i} = 1$. In such a case if worker i becomes more productive, he lowers his investment in the tournament, $\frac{\partial L_i^*}{\partial v_i} < 0$. The reason for this result is that the cost of participation in the tournament becomes larger while the benefit from winning does not change. From Eq. (E.76), the rival, worker j , does not change his promotion-seeking effort, $\frac{\partial L_j^*}{\partial v_i} = 0$. The probability that worker i is promoted is not affected, $\frac{d \text{Pr}_i^*}{d v_i} = 0$, and the total amount of resources

invested in the tournament remains unchanged, $\frac{\partial(v_i L_i^* + v_j L_j^*)}{\partial v_i} = 0$. In this case the decline in L_i corresponding to the increase in v_i is equal in absolute terms to the increase in v_i , which leaves $L_i v_i$ unchanged.

b. When $\frac{\partial p_i}{\partial v_i} = 0$, $\eta_i < 0$. In this situation, an increase in the productivity of worker i does not affect the productivity in the higher rung. In such a case worker i reduces his promotion-seeking effort. The alternative cost of participation in the tournament increases with an increase in v_i , while the benefit associated with promotion is reduced, $\frac{\partial(p_i - v_i)}{\partial v_i} = -1$. Consequently, $\frac{\partial L_i^*}{\partial v_i} < 0$.

Worker j also reduces his effort, $\frac{\partial L_j^*}{\partial v_i} < 0$. If worker i has an advantage over worker j , then the probability that worker i wins the tournament declines and the total resources invested in the tournament are reduced. The situation may characterize state-owned firms. In such firms wages in the higher rungs are often fixed (linked to the salaries of public officials), i.e. wages are independent of productivity. In such a situation we may well observe that the more productive workers have a lower probability of being promoted as their alternative cost of participation in the tournament increases with their productivity while the benefit from success, $p_i - v_i$, decreases with an increase in productivity.

3 Summary

Tournaments are usually considered as efficiency-enhancing mechanisms that can successfully cope with the problem of identifying the more productive workers under incomplete information regarding individual skills. Incentives to perform are created by the increased benefit associated with the achievement of a higher rank. The effectiveness of a tournament in eliciting information about productivity hinges on its appropriate design and on the production function. Our alternative rationalization of tournaments is based on the recognition that the benefit of principals often derives not only from the profit of the firm, but also from the promotion-seeking efforts of their employees. This alternative complementing rationalization of the common management practice of holding competition for promotion can be valid even when the principal has complete information on skills. The rationale, then, behind a tournament may not be the principal's lack of information but rather his mixed objectives. In other words, the existence of a tournament can be due to more than meets the eye of a reader of the vast tournament literature.

The effectiveness of the proposed rationalization hinges on the weight assigned to the promotion-seeking efforts relative to the weight assigned to the profitability of the firm, on the effect of promotion on individual productivity and on the contest success function. Our first four results ((i)–(iii)) provide necessary and sufficient conditions in terms of these parameters for a promotion tournament to be preferred from the principal's viewpoint to certain promotion of the more productive employee. The remaining four comparative

statics results ((iv)–(vii)) focus on the effect of increased individual productivity on the individual workers' promotion-seeking efforts, on their probability of promotion and on the aggregate efforts invested by the workers in the promotion tournaments. These conditions clarify under what circumstances the less-productive employees in the team are more likely to be promoted and under what conditions higher individual productivity results in increased wasted promotion-seeking efforts.

Usually, principals have incomplete information on the productivity of their workers and profit maximization is not their only concern. This implies that, in general, the existence of tournaments reflects both the principals' environmental constraint (the uncertainty regarding potential and realized productivity) and their mixed motives (the benefit derived from profits and from promotion-seeking efforts). One interesting question is how can one deduce from empirical data on tournaments to what extent they reflect the two possible rationalizations. Another challenging task is the design of an optimal tournament that takes into account the two possible rationalizations. The answer to these empirical and theoretical issues is beyond the scope of this chapter and is left for future research.

References

1. Alesina, A. and Cuikerman, A., (1990) "The Politics of Ambiguity", *Quarterly Journal of Economics*, CV(4), 829–850.
2. Allard, R.J., (1988) "Rent seeking with non-identical players", *Public Choice* 57, 3–14.
3. Amegashie, J.A., (1999) "The Design of Rent-Seeking Competitions: Committees, Preliminary and Final Contests", *Public Choice* 99(1–2), 63–76.
4. Amegashie, J.A., (2004) "A Political Economy Model of Immigration Quotas", *Economics of Governance* 5: 255–267.
5. Appelbaum, E. and Katz, E., (1986) "Transfer Seeking and Avoidance: On the Full Social Cost of Rent Seeking", *Public Choice* 48, 175–181.
6. Appelbaum, E. and Katz, E., (1987) "Seeking Rents by Setting Rents: The Political Economy of Rent Seeking", *Economic Journal* 97, 685–699.
7. Baik, K.H., (1994a) "Effort Levels in Contests with Two Asymmetric Players", *Southern Economic Journal* 61, 367–378.
8. Baik, K.H., (1994b) "Winner-Help-Loser Group Formation in Rent-Seeking Contests", *Economics and Politics* 6, 147–162.
9. Baik, K.H. and Kim, I.G., (1997) "Delegation in Contests", *European Journal of Political Economy* 13, 281–298.
10. Baik, K.H., (1998) "Difference-form Contest Success Functions and Effort Levels in Contests", *European Journal of Political Economy* 14(4), 685–701.
11. Baik, K.H., (1999) "Rent-Seeking Firms, Consumer Groups and the Social Costs of Monopoly" *Economic Inquiry* 37(3), 542–554.
12. Baik, K.H. and Lee S., (1997) "Collective Rent Seeking with Endogenous Group Sizes", *European Journal of Political Economy* 13: 121–130.
13. Baik, K.H. and Lee, S., (2001) "Strategic Group and Rent Dissipation", *Economic Inquiry*, 39(4), 672–684.
14. Baik, K.H. and Kim, I.G., (1997) "Delegation in Contests", *European Journal of Political Economy* 13, 281–298.
15. Baik, K.H. and Shogren, J.F., (1992) "Strategic Behavior in Contests: Comment", *American Economic Review* 82, 359–362.
16. Barzel, Y. and Sass, T.R., (1990) "The Allocation of Resources by Voting", *Quarterly Journal of Economics*. 105(3): 745–771.
17. Bauer, T.K. and Zimmermann, K.F., (eds.) (2002) *The Economics of Migration*. Edward Elgar Publishing, Cheltenham, Edward Elgar.

18. Baye, M.R., Kovenock, D., and de Vries, C., (1993) "Rigging the Lobbying Process: An Application of the All-Pay Auction", *American Economic Review*, 83, 289–294.
19. Baye, M.R. and Shin, U., (1999) "Strategic Behavior in Contests: Comment", *American Economic Review* 89(3), 691–698.
20. Becker, G.S., (1983) "A Theory of Competition Among Pressure Groups for Political Influence", *Quarterly Journal of Economics* 98, 371–400.
21. Beckmann, M.J., (1978), *Rank in Organizations*, Springer-Verlag, Berlin.
22. Benhabib, J., (1996) "On the Political Economy of Immigration", *European Economic Review* 40, 1737–1743.
23. Bernheim, D. and Whinston, M.D., (1986), "Common Agency", *Econometrica*, 54(4), 923–942.
24. Besley, T. and Coate, S., (1997) "An Economic Model of Representative Democracy", *Quarterly Journal of Economics*, 108, 85–114.
25. Besley, T. and Coate, S., (2001) "Lobbying and Welfare in a Representative Democracy", *Review of Economic Studies*, 68, 67–82.
26. Boeri, T., Hanson, G., and McCormick, B., (eds.) (2002) *Immigration Policy and the Welfare System*, Oxford University Press, Oxford.
27. Borjas, G.J., (1994) "The Economics of Immigration". *Journal of Economics Literature* 32, 1667–1717.
28. Borjas, G.J., (1995) "The Economic Benefits if Immigration of Immigration". *Journal of Economic Perspectives* 9, 3–22.
29. Borjas, G.J., (1999) *Heaven's Door*. Princeton University Press, Princeton.
30. Bos, D., (2000) "Privatization under Asymmetric Information", CESif Working Paper No. 244.
31. Bos, D., and Harms, P., (1997) "Mass Privatization, Management Control and Efficiency", *Journal of Public Economics* 64, 343–357.
32. Bos, D., and Nett, L., (1991) "Employee Ownership and Privatization: A Comment", *Economic Journal* 101, 966–969.
33. Boyce, J.R., (1994) "Allocation of Goods by Lottery", *Economic Inquiry* 32, 457–476.
34. Boycko, M., Shleifer, A., and Vishny, R.W., (1994) "Voucher Privatization", *Journal of Financial Economics* 35, 249–266.
35. Boycko, M., Schleifer, A., and Vishny, R., (1996) "A Theory of Privatization", *Economic Journal* 106, 309–319.
36. Buckley, F.H., (1996) "The Political Economy of Immigration Policies", *International Review of Law and Economics* 16(1): 81–99.
37. Bulow, J. Geanakoplos, J., and Klemperer, P., (1985) "Multi-market Oligopoly: Strategic Substitutes and Complements", *Journal of Political Economy* 93, 488–511.
38. Cairns, R.D. and Long, N.V., (1991) "Rent Seeking with Uncertain Opposition", *European Economic Review* 35, 1223–1235.
39. Cantor, P., (1996), "To Privatize or Not to Privatize: That is the Question: What is the Answer?", *Review of the Radical Political Economics* 28, 96–111.
40. Card, D. and Krueger A.B., (1994) "Minimum Wage and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania", *American Economic Review* 84(4), 772–793.
41. Card, D. and Krueger A.B., (1995) *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton University Press, Princeton.

42. Carmichael, H.L., (1983) "The Agent-Agents Problem: Payment by Relative Output", *Journal of Labor Economics* 1(1), 50–65.
43. Carrington, W.J., Detragiache, E., and Vishwanath, T. (1996) "Migration with Endogenous Moving Costs", *American Economic Review* 86(4), 909–930.
44. Che, Y. and Gale, I., (1997) "Rent Dissipation when Rent Seekers are Budget Constrained", *Public Choice* 92, 109–126.
45. Che, Y.K. and Gale, I., (1998) "Caps on Political Lobbying", *American Economic Review* 88, 643–651.
46. Cheung, F.K. and Wang, X., (1996) Price Discrimination in a Rent-Seeking Economy. *Public Choice* 86, 103–116.
47. Chiswick, B.R. and Miller, P.M., (1996) "Ethnic Networks and Language Proficiency Among Immigrants", *Journal of Population Economics* 9(1), 19–35.
48. Chung, T.-Y., (1996) "Rent-Seeking Contest when the Prize Increases with Aggregate Efforts", *Public Choice* 87, 55–66.
49. Church, J. and King, I., (1983) "Bilingualism and Network Externalities", *Canadian Journal of Economics* 26(2), 337–345.
50. Clark, D.J. and Riis, C., (1998) "Competition Over More Than One Prize", *American Economic Review* 88, 276–289.
51. Coase, R., (1960) "The Problem of Social Cost", *Journal of Law and Economics* 3, 1–44.
52. Cukierman, A., Hercowitz, Z., and Pines, D., (1993) "The Political Economy of Immigration", Tel Aviv Foerder Institute for Economic Research Working Paper 17/93.
53. Cukierman, A. and Tommasi, M., (1998) "When Does It Take a Nixon To Go To China", *American Economic Review* 88(1), 180–197.
54. Dasgupta, A. and Nti, K.O., (1998) "Designing an Optimal Contest", *European Journal of Political Economy* 14(4), 587–603.
55. Dixit, A., (1987) "Strategic Behavior in Contests", *American Economic Review* 77, 891–898.
56. Downs, A., (1957) *An Economic Theory of Democracy*, Harper and Row, New York, *Economic Review* 48(1), 201–210.
57. Druk-Gal, B., Epstein, G.S., and Nitzan, S., (2004) "Contestable Privatization", *Journal of Economic Behavior and Organization* 54(3), 377–387.
58. Dustmann, C. and Preston, I., (2004) "Is Immigration Good or Bad for the Economy? Analysis of Attitudinal Responses", CReAM Discussion Paper No 06/04.
59. Ellingsen, T., (1991) "Strategic Buyers and the Social Cost of Monopoly". *American Economic Review* 81(3), 648–657.
60. Epstein, D. and O'Halloran, S., (1999) *Delegating Powers*, Cambridge University Press, Cambridge.
61. Epstein, G.S., (2003) "Labor Market Interactions Between Legal and Illegal Immigrants". *Review of Development Economics* 7(1), 30–43.
62. Epstein, G.S. and Nitzan, S., (1999) "The Endogenous Determination of Minimum Wage", IZA working paper no. 73.
63. Epstein, G.S. and Nitzan, S., (2002a) "Stakes and Welfare in Rent-Seeking Contests", *Public Choice* 112(1), 137–142.
64. Epstein, G.S. and Nitzan, S., (2002b) "Endogenous Public Policy, Politicization and Welfare", *Journal of Public Economic Theory* 4(4), 661–677.
65. Epstein, G.S. and Nitzan, S., (2002c) "Asymmetry and Corrective Public Policy in Contests", *Public Choice* 113(1–2), 231–240.

66. Epstein, G.S. and Nitzan, S., (2003a) "The Social Cost of Rent Seeking When Consumer Opposition Influences Monopoly Behavior", *European Journal of Political Economy* 19, 61–69.
67. Epstein, G.S. and Nitzan, S., (2003b) "Political Culture and Monopoly-price Determination". *Social Choice and Welfare* 21, 1–19.
68. Epstein G.S. and Nitzan, S., (2004) "Strategic Restraint in Contests", *European Economic Review* 48, 201–210.
69. Epstein, G.S. and Nitzan, S., (2004w) "Tournaments: There is More Than Meets the Eye", IZA working paper no. 1203.
70. Epstein, G.S. and Nitzan, S., (2005) "Size and Distribution of Prizes and Efforts in Contests", *Economics Bulletin* 8(10), 1–10.
71. Epstein, G.S. and Nitzan, S., (2006a) "Lobbying and Compromise", *Public Choice* 126, 317–330.
72. Epstein, G.S. and Nitzan, S., (2006b) "Effort and Performance in Public-Policy Contests", *Journal of Public Economic Theory* 8(2), 265–282.
73. Epstein, G.S. and Nitzan, S., (2006c) "The Politics of Randomness", *Social Choice and Welfare* 27(2), 423–433.
74. Epstein, G.S. and Nitzan S., (2006d) "Reduced Prizes and Increased Effort in Contests", *Social Choice and Welfare* 26(3), 447–453.
75. Epstein, G.S. and Nitzan S., (2006e) "The Struggle Over Migration Policy", *Journal of Population Economics* 19(4), 703–723.
76. Epstein, G.S. and Hillman, A.L., (2003) "Unemployed Immigrants and Voter Sentiment in the Welfare State", *Journal of Public Economics* 87, 1641–1655.
77. Epstein, G.S., Hillman, A.L., and Weiss, A., (1999) "Creating Illegal Immigrants", *Journal of Population Economics* 12(1), 3–21.
78. Esteban, J. and Ray, D., (1999) "Conflict and Distribution", *Journal of Economic Theory* 87, 379–415.
79. Ethier, W.J., (1986) "Illegal Immigration: The Host Country Problem", *American Economic Review* 76, 56–71.
80. Fabella, R.V., (1995) "The Social Cost of Rent Seeking Under Countervailing Opposition to Distortionary Transfers", *Journal of Public Economics* 57, 235–247.
81. Felli, L. and Merlo, A., (2001) "Endogenous Lobbying", CESifo, WP No. 291.
82. Fullerton, R.L. and McAfee, P., (1999) "Auctioning Entry into Tournaments", *Journal of Political Economy* 3, 573–905.
83. Gal, B. and Yaari, V., (2001) "The War of Attrition Between Government and Employees in Implementing Privatization", Department of Economics, Bar-Ilan University. Mimeo.
84. Gang, I.N. and Rivera-Batiz, F., (1994) "Labor Market Effects of Immigration in the United States and Europe: Substitution vs. Complementarity", *Journal of Population Economics* 7, 157–175.
85. Gibbs, M.J., (1989), *Promotions, Compensation, and Firm Organization*. PhD. dissertation, University of Chicago.
86. Glazer, A., Gradstein, M., and Konrad, K.A., (1998) "The Electoral Politics of Extreme Policies". *The Economic Journal* 108(451), 1677–1685.
87. Glazer, A. and McMillan, H., (1992) "Pricing by the Firm under Regulatory Threats", *Quarterly Journal of Economics* 107, 1089–1099.
88. Gottlieb, P., (1987) *Making Their Own Way: Shorthorn Blacks' Migration to Pittsburgh, 1916–1930*, University of Illinois Press, Urbana.

89. Gradstein, M., (1993) "Rent Seeking and the Provision of Public Goods", *Economic Journal* 103(420), 1236–1245.
90. Gradstein, M., (1994) "Intensity of Competition, Entry and Entry Deterrence in Rent Seeking Contests", *Economics and Politics* 7, 79–91.
91. Gradstein, M. (1995) "Intensity of Competition, Entry and Entry Deterrence in Rent Seeking Contests", *Economics and Politics* 7, 79–91.
92. Gradstein, M., (1998) "Optimal Contest Design: Volume and Timing of Rent Seeking in Contests", *European Journal of Political Economy* 14(4), 575–585.
93. Gradstein, M., (2002) "Can the Pursuit of Rents Grease the Wheels of the Economy? Allocative Benefits of Rent Seeking", mimeo.
94. Gradstein, M. and Konrad, K., (1999) "Orchestrating Rent Seeking Contests", *Economic Journal* 109, 536–545.
95. Graichen, P., Requate T., and Dijkstra, B., (2001) "How to Win the Political Contest: A Monopolist vs. Environmentalists", *Public Choice* 108, 273–293.
96. Groseclose, T. and Snyder, J.M., (1996) "Buying Supermajorities", *American Political Science Review* 90, 303–315.
97. Grossman, G.M. and Helpman, E., (1994) "Protection for Sale", *American Economic Review* 84(4), 833–850.
98. Grossman, G.M. and Helpman, E., (1995) "Trade wars and Trade Talks", *Journal of Political Economy* 103, 675–708.
99. Grossman G.M. and Helpman, E., (1996) "Electoral Competition and Special Interest Politics", *Review of Economic Studies* 63, 265–286.
100. Grossman G.M. and Helpman, E., (2001) *Special Interest Politics*. MIT Press, Cambridge, MA.
101. Hausken, K., (1995) "The Dynamics of Within-Group and Between-Group Interaction", *Journal of Mathematical Economics* 24, 655–687.
102. Hillman, A.L., (1982) "Declining Industries and Political-Support Protectionist Motives", *American Economic Review* 72, 1180–1187.
103. Hillman, A.L., (1989) *The Political Economy of Protection*. London: Harwood Academic Publishers, London.
104. Hillman, A.L., (1992) "Progress With Privatization", *Journal of Comparative Economics* 16, 733–749.
105. Hillman, A.L. and Riley, J.G., (1989) "Politically Contestable Rents and Transfers", *Economics and Politics* 1, 17–39.
106. Hillman, A.L. and Weiss, A., (1999) "A Theory of Permissible Illegal Immigration", *European Journal of Political Economy* 15, 585–604.
107. Hirshleifer, J., (1989) "Conflict and Rent-Seeking Success Function: Ratio vs. Differences Models of Relative Success", *Public Choice* 63, 101–112.
108. Holt, C. and Sherman, R., (1982) "Waiting Line Auction", *Journal of Political Economy* 90, 280–294.
109. Hoyt, W.H. and Toma, E.F., (1989) "State Mandates and Interest Group Lobbying", *Journal of Public Economics* 38, 199–213.
110. Hurley, T.M. and Shogren, J.F., (1998) "Effort Levels in Cournot-Nash Contests with Asymmetric Information", *Journal of Public Economics* 69, 195–210.
111. Katz, E. and Tokatlidu, J., (1996) "Group Competition for Rents", *European Journal of Political Economy* 12(4), 599–607.
112. Keem, J.H., (2001) "The Social Cost of the Monopoly when Consumers Resist", *European Journal of Political Economy* 17, 633–639.

113. Koh, W.T.H., Yang, Z., and Zhu, L., (2002) "The General Dominance of Lottery over Waiting Line", mimeo.
114. Kohli, I. and Singh, N., (1999) "Rent Seeking and Rent Setting with Asymmetric Effectiveness of Lobbying", *Public Choice* 99, 275–298.
115. Konrad, K.A., (2000) "Sabotage in Rent-Seeking Contests", *The Journal of Law, Economics And Organization* 16(1), 155–165.
116. Konrad, K.A., (2002), "Investment in the Absence of Property Rights; the Role of Incumbency Advantages", *European Economic Review* 46(8), 1521–1537.
117. Konrad, K.A. and Schlesinger, H., (1997) "Risk Aversion in Rent Seeking and Rent Augmenting Games", *Economic Journal* 107, 1671–1683.
118. Kroszner, R.S., and Strahan, P.E., (1999) "What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions", *Quarterly Journal of Economics* 114(4), 1437–1467.
119. Krueger, A.O., (1974) "The Political Economy of the Rent-Seeking Society", *American Economic Review* 4, 291–303.
120. Laffont, J.J. and Tirole, J., (1992) "Privatization and Incentives", *The Journal of Law, Economics and Organization* 7, 84–105.
121. Lagerlof, J., (1997) "Lobbying Information and Private and Social Welfare", *European Journal of Political Economy* 13(3), 615–637.
122. Lazear, E.P., (1989) "Pay Equality and Industrial Politics", *Journal of Political Economy* 97, 561–580.
123. Lazear, E.P., (1996), *Personnel Economics*, 2nd edn, MIT Press, Cambridge.
124. Lazear, E. and Rosen, S., (1981) "Rank Order Tournaments as Optimal Labor Contracts", *Journal of Political Economy* 89, 841–864.
125. Lee, S., (1995) "Endogenous Sharing Rules in Collective-Group Rent Seeking", *Public Choice* 75, 43–62.
126. Leidy, M.P., (1994) "Rent Dissipation Through Self-Regulation: The Social Cost of Monopoly Under the Threat of Reform", *Public Choice* 80, 105–128.
127. Leininger, W., (1993) "More Efficient Rent Seeking – A Munchausen Solution", *Public Choice* 75, 43–62.
128. Levin-Waldman, O.M., (1998) "Exploring the Politics of the Minimum Wage", *Journal of Economics Issues* 32(3), 773–802.
129. Lockard, A. and Tullock, G., (2001) *Efficient Rent Seeking: Chronicle of an Intellectual Quagmire*, Kluwer (Boston).
130. Long, N.V. and Voutsden, N., (1991) "Protectionist Responses and Declining Industries", *Journal of International Economics* 30(1–2), 87–103.
131. Magee, S.P., Brock, W.A., and Young, L., (1989) *Black Hole Tariffs and Endogenous Policy Theory, Political Economy in General Equilibrium*, Cambridge University Press, Cambridge.
132. Malcomson, J.M., (1984) "Work Incentives, Hierarchy, and Internal Labor Markets", *Journal of Political Economy* 92(3), 486–507.
133. Martin, S. and Parker, D., (1997) *The Impact of Privatization Ownership and Corporate Performance in the UK*, Routledge, London and New York.
134. Mayer, W., (1984) "Endogenous Tariff Formation", *American Economic Review* 74(5), 970–985.
135. Mazza, I. and van Winden, F., (2003) "An Endogenous Policy Model of Hierarchical Government", University of Catania and University of Amsterdam, Mimeo.

136. Megginson, W.L., Nash, R.C., and van Randenborgh, M., (1994) "The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis", *The Journal of Finance* 49, 403–452.
137. Milgrom, P.R. and Roberts, J., (1992) *Economics, Organization and Management*, Prentice Hall, Englewood Cliffs, NJ..
138. Morgan, J., (1998) "Is Timing Everything? A Model of Endogenous Sequential Contests", Mimeo.
139. Mueller, D.C., (2003), *Public Choice III*, Cambridge University Press, Cambridge, England.
140. Mundell, R.A., (1957) "International Trade and Factor Mobility", *American Economic Review* 47(3): 321–335.
141. Munster, J., (2004) "Lobbying Contests with Endogenous Policy Proposals", WZB Working Paper SPII, 2005–2011.
142. Niskanen, W.A., (1971) *Bureaucracy and Representative Government*, Aldine, Chicago.
143. Nitzan, S., (1991) "Collective Rent Dissipation", *Economic Journal* 101, 1522–1534.
144. Nitzan, S., (1994) "Modelling Rent-Seeking Contests", *European Journal of Political Economy* 10(1), 41–60.
145. Nti, K.O., (1997) "Comparative Statics of Contests and Rent-Seeking Games", *International Economic Review*, 38(1), 43–59.
146. Nti K.O., (1999) "Rent Seeking with Asymmetric Valuations", *Public Choice* 98, 415–430.
147. Nti, K.O., (2002) "Maximum Efforts in Contests with Asymmetric Valuations", mimeo.
148. Paul, C. and Schoening, N., (1991) "Regulation and Rent Seeking: Prices, Profits and Third Party Transfers", *Public Choice* 68, 185–194.
149. Paul, C. and Wilhite, A., (1991) "Rent-Seeking, Rent-Defending, and Rent-Dissipation", *Public Choice* 71, 61–70.
150. Peltzman, S., (1976) "Toward a More General Theory of Regulation", *The Journal of Law and Economics*, 211–240.
151. Perotti, E.C., (1995) "Credible Privatization", *American Economic Review* 4, 847–859.
152. Persson, T. and Tabellini, G., (2000) *Political Economics: Explaining Economic Policy*, MIT Press, Cambridge.
153. Pint, E.M., (1991) "Nationalization vs. Regulation of Monopoly: The Effects of Ownership on Efficiency", *Journal of Public Economics* 44, 131–164.
154. Posner, R., (1975) "The Social Costs of Monopoly and Regulation", *Journal of Political Economy* 83, 807–827.
155. Potters, J. and van Winden, F., (1996) "Models of Interest Groups: Four Different Approaches", in N. Schofield (ed.), *Collective Decision Making, Social Choice and Political Economy* Kluwer, Boston.
156. Radner, R., (1993) "Hierarchy: The Economics of Managing", *Journal of Economic Literature*, pp. 1382–1415.
157. Rama, M. and Tabellini, G., (1995) "Endogenous Distortions in Product and Labor Markets", Policy Research Working Paper 1413, The World Bank.
158. Rama, M., (1997) "Imperfect Rent Dissipation with Unionized Labor", *Public Choice* 94, 55–75.

159. Rama, M. and Tabellini, G., (1998) "Lobbying by Capital and Labor Over Trade and Labor Market Policies", *European Economic Review* 42(7), 1295–1316.
160. Riaz, K., Shogren, J.F., and Johnson, S.R., (1995) "A General Model of Rent Seeking for Public Goods", *Public Choice* 82, 243–259.
161. Rodrik, D., (1986) "Tariffs, Subsidies and Welfare with Endogenous Policy", *Journal of International Economics* 21, 285–299.
162. Rodrik, D., (1994) "What Does the Political Economy Literature on Trade Policy (Not) Tell Us That We Ought to Know", In *Handbook of International Economics*, Vol. III, North Holland, Amsterdam.
163. Rosen, S., (1986) "Prizes and Incentives in Elimination Tournaments", *The American Economic Review* 76(4), 701–715.
164. Saint-Paul, G., (1996) "Exploring the Political Economy of Labor Market Institutions", *Economic Policy* 23, 263–315.
165. Saint-Paul, G., (1998) "A Framework for Analyzing the Political Support for Active Labor Market Policy", *Journal of Public Economics* 67, 151–165.
166. Schmidt, C.M., Stilz, A., and Zimmermann, K.F., (1994) "Mass Migration, Unions, and Government Intervention", *Journal of Public Economics* 55, 185–201.
167. Schmidt, T., (1992) "Rent-Seeking Firms and Consumers: An Equilibrium Analysis", *Economics and Politics* 4(2), 137–149.
168. Shepsle, K., (1972) "The Strategy of Ambiguity: Uncertainty and Electoral Competition", *American Political Science Review*, LXVI, 555–568.
169. Shleifer, A. and Vishny, R.W., (1994) "Politicians and Firms", *The Quarterly Journal of Economics*, 995–1102.
170. Skaperdas, S., (1992) "Cooperation, Conflict and Power in the Absence of Property Rights", *American Economic Review* 82(4), 721–739.
171. Skaperdas, S., (1996) "Contest Success Functions", *Economic Theory* 7, 283–290.
172. Smith, J.P. and Edmonston, B. (eds.) (1997) *Panel on the Demographic and Economic Impacts of Immigration*. National Research Council.
<http://books.nap.edu/catalog/5779.html>
173. Snyder, J.M., (1989) "Election Goals and the Allocation of Campaign Resources", *Econometrica* 57, 637–660.
174. Sollner, F., (1999) "A Note on the Political Economy of Immigration", *Public Choice* 100(3–4), 245–251.
175. Storesletten, K., (2000) "Sustaining Fiscal Policy Through Immigration", *Journal of Political Economy* 108, 300–323.
176. Suen, W., (1989) "Rationing and Rent Dissipation in the Presence of Heterogeneous Individuals", *Journal of Political Economy* 97, 1384–1394.
177. Sun, G.-Z. and Ng, Y.K., (1999) "The Effect of Number and Size of Interest Groups on Social Rent Dissipation", *Public Choice* 101, 251–265.
178. Swank, O.H., Letterie, W., and van Dalen, H.P., (1999) "A Theory of Policy Advice", *Journal of Law, Economics and Organization* 15(3), 602–614.
179. Taylor, G.A., Tsui, K.K., and Zhu, L., (2003) "Lottery or Waiting-Line Auction?", *Journal of Public Economics* 87, 1313–1334.
180. Tirole, J., (1988) *The Theory of Industrial Organization*. MIT University Press, Cambridge, MA.
181. Tollison, R.V., (1982) "Rent Seeking: A Survey", *Kyklos* 35, 575–602.

182. Tullock, G., (1967) "The Welfare Costs of Tariffs, Monopolies and Theft", *Western Economic Journal* 5, 224–232.
183. Tullock, G., (1980) Efficient Rent-Seeking. In: Buchanan, J.M., Tollison, R.D., and Tullock, G. (eds.) *Toward a Theory of the Rent-Seeking Society*. Texas A. and M. University Press, College Station, TX, 97–112.
184. Ursprung, H.W., (1990) "Public Goods, Rent Dissipation and Candidate Competition", *Economics and Politics* 2, 115–132.
185. van Winden, F., (1999) "On the Economic Theory of Interest Groups", *Public Choice* 96, 405–410.
186. Wenders, J.T., (1987) "On Perfect Rent Dissipation", *American Economic Review* 77, 456–459.
187. Willner, J., (2001) "Ownership and Efficiency and Political Interference", *European Journal of Political Economy* 17, 723–748
188. Zimmermann, K.F., (1995) "Tackling the European Migration Problem", *Journal of Economics Perspectives* 9, 45–62.

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