



Rent-seeking incentives in share contests [☆]

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ABSTRACT

This article investigates share contests. In our framework, we allow contestants to have more general preferences than have been used in the literature. Previous approaches have the unfortunate characteristic that contestants' marginal rates of substitution between the rent share allocated by the contest and their effort is constant regardless of the size of the rent share. This results in a conventional wisdom: larger rents command more effort. By providing a more general framework, we show the reverse may also be true and we derive the conditions under which this is the case. Our approach then allows us to rationalize, within a standard contest framework, observations that rents might be more hotly contested when they become scarcer, as has evidently been the case with the recent global contraction of public funds available for public policy.

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1. Introduction

Sayre's law: "In any dispute, the intensity of feeling is inversely proportional to the value of the stakes at issue. That is why academic politics are so bitter." (Coleman, 2008)

Contests characterize situations in which individuals seek to appropriate an economic rent. This describes a wealth of economic scenarios—such as rent seeking, litigation, and conflict—where the study of contests has improved our understanding of many fundamental economic interactions. The conventional wisdom borne from the analysis of contests suggests that rent-seeking effort is increasing in the size of the rent. Although this is consistent with many

applications, there are, however, many other environments in which we might observe that the reverse is true; *Sayre's law*—quoted at the beginning of this introduction—being a case in point.

We focus on rent-seeking incentives in share contests, and motivate our analysis with an application to contests over public funds. In such contests, the contestants are lobbyists who invest effort to obtain a share of a rent that is public funds to provide a public good and we relate the size of this rent, as measured by the amount of available public funds, to rent-seeking efforts. Epstein and Nitzan (2007) argue at length why contests are an appropriate tool for studying public policy and public good provision, while equally providing a host of potential applications. For example, groups may rent seek for investments in health as favored by the elderly (and backed by the pharmaceutical lobbies) as opposed to the young (supported by teachers' associations) who aim at improving education (Cattaneo and Wolter, 2009). The conventional wisdom may apply in such contexts since lobbying groups are typically thought to intensify their efforts in the presence of higher stakes. Yet, as the recent anti-austerity protests and strikes across Europe testify, rent seeking for special interests may very well become more intense in the presence of cuts in government funds. As Reuters (2010) report, "As ministers and civil servants pore over budget books and decide what goes and what stays, an army of lobbyists, consultants, companies and campaigners is fighting to hold the line...". The evidence

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goes beyond anecdotal narratives: a recent study by Ponticelli and Voth (2017) identifies a causal effect of expenditure cuts on social unrest in Europe over the period 1919–2008. The goal of this article, therefore, is to provide a rational explanation for these seemingly contradictory observations that contest effort may either increase or decrease in the size of the rent.

To that end, we develop a novel and general contest theory in which a perfectly divisible rent (e.g., public funds) is shared among contestants (e.g., lobbyists) that have general preferences. Contests in the spirit of Tullock (1980) can be interpreted in two ways: ‘winner-take-all’ or ‘probabilistic’ contests; and ‘share’ contests. In the ‘winner-take-all’ interpretation there exists a *probability* that a player receives the entire rent based on their relative effort. In a ‘share’ contest, in contrast, each individual receives a (deterministic) share of the rent based on their effort relative to that of their rivals. Share contests capture lots of important economic scenarios: we focus on contests for public funds to motivate and illustrate ideas in this paper, but there are numerous other applications, for instance, to land conflict and rent seeking over foreign aid (e.g., Svensson, 2000; Skaperdas and Syropoulos, 2002; Hodler, 2007). Despite their wide applicability, share contests have seen relatively little attention in the literature, which has tended to focus on winner-take-all contests with the occasional extension of ideas to share contests. But the two interpretations are fundamentally different in all but the simplest settings. The aim of this paper is to go beyond the simplest setting and explore how share contests work when contestants have, what we will argue are, realistic preferences.

We will denote by R the rent that is being contested; by x^i the effort of contestant i ; and by z^i the contest allocation that contestant i receives. Let ϕ for the moment denote the ‘contest success function’ that depends on the efforts of all contestants. In a winner-take-all contest, ϕ determines the probability of winning the entire rent, whereas in a share contest ϕ determines each contestant’s share of the rent. Consider that contestants derive utility from the outcome of the contest and the effort they exert in contesting the rent, captured by $u^i(z^i, x^i)$. Then the appropriate payoff function in a winner-take-all contest is the expected utility $\phi u^i(R, x^i) + [1 - \phi]u^i(0, x^i)$, whereas in a share contest the appropriate payoff function is $u^i(\phi R, x^i)$. If u^i is linear so $u^i(z^i, x^i) = z^i - x^i$, or quasi-linear of the form $u^i(z^i, x^i) = z^i - c^i(x^i)$, then these payoffs are the same so share contests and winner-take-all contests are strategically equivalent (Cason et al., 2013), otherwise they command separate study.

Although major advances have been made in developing the analysis of winner-take-all contests to capture non-linear evaluation of contest outcomes by allowing for risk aversion since the contribution of Hillman and Katz (1984)¹, the same is not true of share contests: the two are not equivalent under this extension. Where share contests have been studied in the literature the payoff functions used have either been of the linear or quasi-linear form so in fact the analysis of winner-take-all contests can be transferred to share contests, or where contestants evaluate the net rent so $u^i(z^i, x^i) = v^i(z^i - x^i)$ (see, for instance, Skaperdas and Gan (1995) and Konrad and Schlesinger (1997) whose focus is on winner-take-all contests but include an extension to share contests) where the analysis aligns with the linear case since this is a monotonic transformation of a linear payoff function. These payoff functions share

the unfortunate characteristic that the marginal rate of substitution between effort and the contest allocation is the same regardless of the size of the contest allocation. Put another way, the amount of contest allocation a contestant is willing to give up to save a unit of effort is the same no matter how large or how small their allocation from the contest is. We find this restrictive and indeed unrealistic. In our example of contests for public funds, it is highly likely that lobby groups will be much less willing to give up funds to save lobbying effort when funds are scarce than when they are in abundance, so in this application, and indeed in general, we require a theory of contests that allows this marginal rate of substitution to potentially increase in the size of the allocation.

We achieve this by retaining generality in contestants’ payoff functions, allowing them to take the form $u^i(z^i, x^i)$ where the marginal rate of substitution between effort and the contest allocation, $MRS^i = -u_x^i/u_z^i$, is not restricted to be constant in z^i , as is the case in the existing literature. We focus initially on simple Tullock contests, and follow the approach of Cornes and Hartley (2003, 2005, 2012) by recognizing and exploiting the aggregative properties of the game that is played. Cornes and Hartley (2005) address the issue of existence and uniqueness of equilibrium in contests with heterogeneous players assuming linear evaluation of the contest allocation; we extend this result to the case of more general preferences, providing sufficient conditions for the existence and uniqueness of Nash equilibrium. We then study the comparative static properties of equilibrium, particularly considering the effect of a change in the size of the contested rent.² What is interesting is that when we capture these more realistic preferences the conventional wisdom of a positive relationship between the size of the contested rent and equilibrium rent-seeking effort need no longer hold, but in fact can be reversed: so when rents become scarcer they might be more hotly contested, or when they become more abundant effort goes down. For individual choices, this occurs if the marginal rate of substitution increases sufficiently as z^i increases, as measured by the z^i -elasticity of the marginal rate of substitution that needs to exceed one for effort to decrease in the size of the rent, and we provide a related condition that gives the conditions under which equilibrium aggregate effort declines in the contested rent. This can be true for very standard preferences and requires that contestants have either sufficiently strong diminishing marginal utility over the contest allocation (u_{zz}^i is sufficiently negative), or sufficiently strong substitutability between effort and the contest allocation (u_{zx}^i is sufficiently negative), or a combination of these.

Our analysis of contests with more general preferences means that standard contest theory can now be used to rationalize situations in which increases in contested rents command less effort, or indeed reductions in contested rents command more effort. In the context of our application to contests for public funds, our model makes a substantial contribution to the related literature. While scholars have already focused on rent seeking over public policy and public funds, the majority of studies use a conventional quasi-linear utility setup and focus on questions of heterogeneity in group size and composition (Riaz et al., 1995; Katz and Tokatlidu, 1996; Cheikbossian, 2008), or on comparing rent seeking with the

¹ See, for instance, Long and Voutsden (1987), Skaperdas and Gan (1995), Riaz et al. (1995), Konrad and Schlesinger (1997), Treich (2010), Cornes and Hartley (2012), Jindapon and Whaley (2015), Schroyen and Treich (2016), Jindapon and Yang (2017), and Konrad (2009) and Congleton and Hillman (2015) for reviews. Long and Voutsden (1987) consider a model in which individuals each contest a rent that they will ultimately receive a share of, but the share is determined randomly, the process being influenced by all contestants’ choices of efforts. However, this is not a contest as axiomatized by Skaperdas (1996) since there is nothing to tie the shares of contestants together that would ensure the full rent, and only the full rent, is allocated.

² When seeking to understand the comparative static properties of this game, a natural place to turn is the literature on aggregative games. Corchón (1994) investigates the comparative static properties of aggregative games in a general setting but assumes the game is one of strategic substitutes. These results do not apply to contests as they are neither games of strategic substitutes nor strategic complements. Acemoglu and Jensen (2013) consider a more general setting and provide sufficient conditions for comparative statics to be—following their terminology—‘regular’ in ‘nice’ aggregative games by considering particular changes in the game termed ‘positive shocks’. However, while all of the conditions are satisfied for contests with a linear evaluation of the contest outcome, their ‘positive shocks’ framework is not suited to the study of contests with heterogeneous contestants that have more general preferences, rendering a bespoke analysis of this framework necessary.

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