Rent Seeking and Organizational Structure*

Karl Wärneryd†

June 2, 2014

SSE/EFI Working Paper Series in Economics and Finance No 749

Abstract

A hierarchically structured rent-seeking contest may be associated with lower equilibrium expenditure than a corresponding flat contest. In this chapter we discuss how this fact may be used to explain the structure of organizations such as firms, including why firms commonly have outside owners. *Journal of Economic Literature* Classification Numbers: D23, D74, G32, G34, L22. Keywords: rent seeking, contests, hierarchy, ownership of firms.

1 Introduction

Conventional wisdom used to have it that the structure of organizations, such as firms, is dictated by technological concerns (see, e.g., Chandler 1962). Thus, for example, as American firms faced expanding markets after around 1850, it successively became necessary to hire administrative experts to specialize in various functions such as production and marketing. As firms diversified, the

*Prepared for Roger D Congleton and Arye L Hillman (eds), *A Companion to Rent Seeking: Theory, Applications, and Existence.*

†Department of Economics, Stockholm School of Economics, Box 6501, SE-113 83 Stockholm, Sweden, and CESifo. Email: Karl.Warneryd@hhs.se

unitary firm structure came to be replaced by the multidivisional firm, with each product line essentially its own organization. And so on.

From a rent-seeking perspective, however, each decision-maker in an organization is also a locus of influence. If decisions affect the fortunes of others in the organization, those others will have an incentive to try to exert influence to have decisions made in their favor. To the extent that such influence activities are about purely distributional concerns, and involve the spending of resources or efforts that could have been deployed productively instead, they may represent a cost to the organization—and, indeed, ultimately to society. (See Tullock 1967.) In this chapter we shall investigate how different organizational structures give rise to different levels of these costs.

Intuition might suggest that the more levels, and thus the more nodes of decision-making, a hierarchical organization has, the more resources will necessarily be wasted on rent seeking. Indeed, this seems to be taken for granted in such writings on influence activities in organizations as Meyer *et al* (1992), Milgrom and Roberts (1990), and Scharfstein and Stein (2000). A central message of this chapter, in contrast, will be that *hierarchy can help to decrease rent-seeking costs*, thus providing an explanation for its existence in the first place.

Neoclassical economics provides no hints as to why there are firms and organizations in the economy in the first place, let alone why they should be structured in a particular way. The firm of general equilibrium theory is just a black-box production function, and all transactions take place in the market. In his famous paper in 1937, Coase (1937) argued that real-world firms owe their existence to what is now commonly known as *transaction costs*, costs of transacting in the market that can be avoided within a firm. Coase exemplified transaction costs by such things as the search cost of finding somebody to transact with, the cost of drafting a contract once a partner has been found, and the cost of enforcing contracts. According to Coase, these costs do not arise within the firm because the firm is characterized by the fact that one party, the firm's owner, has the power simply to decree the terms of any within-firm transaction.

Quite apart from how this explanation for the firm's rationale seems to attribute too much authority to the firm's owner, it does not shed any light on the most common form of ownership of firms today, that of separation of ownership and control. As we shall see, the rent-seeking perspective can provide an explanation for why it may be optimal for a firm to have outside owners, rather than operate as a partnership or cooperative.

2 Rent seeking and hierarchy

2.1 *The flat organization*

Consider an organization comprised of n identical participants, who produce something together that is worth Y. Suppose it is not possible to write an enforceable contract that specifies how Y should be split among the participants; instead, each individual may exert effort or spend resources on obtaining a larger share, in competition with the others. Let x_i be the level of such appropriative effort engaged in by individual participant i. We shall assume that the share of the surplus that accrues to individual i, given everybody's rent-seeking expenditures, is

$$p_i(x_1, x_2, \ldots, x_n) := \begin{cases} x_i / \sum_j x_j & \text{if } \sum_j x_j > 0 \\ 1/n & \text{otherwise.} \end{cases}$$

This particular *contest success function* was introduced by Tullock (1980) explicitly for the study of rent seeking, and has become very popular in the literature. As such, it has a somewhat *ad hoc* flavor, as it is not immediately clear why the rent seeking process should be of this specific nature. It was axiomatized by Skaperdas (1996).

Assuming rent-seeking expenditures come at unit cost, individual i's objective or utility function is then

$$u_i(x_1, x_2, \ldots, x_n) := p_i(x_1, x_2, \ldots, x_n)Y - x_i.$$

First note that it cannot happen in equilibrium that nobody expends anything. For assume everyone except individual i expends nothing on rent seeking. If individual i then also expends nothing, he gets Y/n. If instead he expends some very small amount he gets all of Y, less that small amount. Hence there must be some such small amount that individual i could profitably spend.

Taking everyone else's expenditures as given, the first order condition for a best reply expenditure on the part of individual i is therefore

$$\frac{\partial u_i}{\partial x_i} = \frac{\sum_j x_j - x_i}{(\sum_j x_j)^2} Y - 1 = 0.$$

To solve for equilibrium expenditures, we can make use of the fact that we have a symmetric situation. Inspection of the first-order condition reveals that each individual best-reply expenditure depends only on the total of expenditures. Hence in equilibrium it must be the case that everybody makes the same expenditure $x^\star$. The above expression may then be written as

$$\frac{nx^\star - x^\star}{(nx^\star)^2} Y - 1 = 0.$$

The solution is therefore

$$x^\star = \frac{n-1}{n^2} Y.$$

Hence individual equilibrium utility is Y/n^2. Aggregate expenditure in equilibrium is

$$nx^\star = \frac{n-1}{n} Y.$$

Definning the rate of rent dissipation as the ratio of total expenditure to the value of the surplus, we have that

$$\delta := \frac{nx^\star}{Y} = \frac{n-1}{n}.$$

With a finite number of participants, therefore, less than the value of the rent is invested in equilibrium. But as n approaches infinity, aggregate expenditure approaches Y and the rate of dissipation approaches 1. Hence "perfect competition" in rent-seeking in this model leads to perfect dissipation.

2.2 *The two-tier organization*

Suppose now that the previously studied organization is split into two divisions, with n_1 and n_2 members, respectively, where $n_1 + n_2 = n$.

We shall assume that rent seeking at the top level takes a similar form to that at the divisional level, but that individual rent seeking efforts increase the divisional share. That is, an increased divisional share is now a public good to members of the division. Specifically, if s_{di} is the top-level rent seeking expenditure of individual i in division d, we shall assume the share of Y that goes to division 1 is

$$\alpha := \begin{cases} \sum_i s_{1i}/(\sum_i s_{1i} + \sum_j s_{2j}) & \text{if } \sum_i s_{1i} + \sum_j s_{2j} > 0 \\ 1/2 & \text{otherwise.} \end{cases}$$

As the division-level contest has the same structure as before, each member of division 1 expect to get $\alpha Y/n_1^2$ in the end. In the top-level contest, the objective function of a member of division 1 is therefore

$$v_{1i} := \frac{\alpha Y}{n_1^2} - s_{1i}.$$

For reasons similar to before, it cannot happen that nobody expends anything in equilibrium. Hence the optimal top-level expenditure of member i in division 1 is given by the first-order condition

$$\frac{Y}{n_1^2} \frac{\sum_j s_{1j}}{(\sum_k s_{1k} + \sum_j s_{2j})^2} = 1.$$

The corresponding condition for a member of division 2 is

$$\frac{Y}{n_2^2} \frac{\sum_k s_{1k}}{(\sum_k s_{1k} + \sum_j s_{2j})^2} = 1.$$

Inspection of these conditions reveals that they do not uniquely determine individual contributions in equilibrium, as only aggregate divisional expenditures matter. This is, of course, because of the public good nature of expenditure at the top level. Hence there are many equilibria, all of them with the property that a division's aggregate expenditure has the same level.

Having noted this multiplicity problem, we now focus on within-division symmetric equilibrium. That is, we now look for an equilibrium such that all individuals in a division make the same equilibrium expenditure. Let s_1 be the common equilibrium expenditure level in division 1, and s_2 that in division 2. The conditions for equilibrium are then that

$$\frac{Y}{n_1^2}\frac{n_2 s_2}{(n_1 s_1 + n_2 s_2)^2} = 1$$

and

$$\frac{Y}{n_2^2}\frac{n_1 s_1}{(n_1 s_1 + n_2 s_2)^2} = 1.$$

Defining $\theta := n_1^2 + n_2^2$, the solution to this system of equations is

$$s_1 = \frac{n_2^2}{n_1}\frac{Y}{\theta^2}$$

and

$$s_2 = \frac{n_1^2}{n_2}\frac{Y}{\theta^2}.$$

This implies that in equilibrium we have $\alpha = n_2^2/\theta$, i.e., the division with fewer members gets the larger share of the top-level pie. The intuition for this is that a dollar increment of the share at this stage is worth more to agents in the less populated division, since less of it will be dissipated in the internal divisional contest than would be the case if it ended up in the more populated division. Therefore individuals in the smaller division are willing to expend relatively more resources to get such an increment.

Note that resources are now expended at both of the two contest levels. Total aggregate expenditure in the hierarchical two-tier organization is therefore

$$X^H := n_1 s_1 + n_2 s_2 + n_1 x_1 + n_2 x_2 = \frac{Y}{\theta} + \frac{n_1 - 1}{n_1} n_2^2 \frac{Y}{\theta} + \frac{n_2 - 1}{n_2} n_1^2 \frac{Y}{\theta}.$$

The corresponding aggregate equilibrium expenditure in a flat organization with the same total number of participants is

$$X^F := \frac{n_1 + n_2 - 1}{n_1 + n_2} Y.$$

The difference in total conflict costs between the two organizations is therefore

$$X^F - X^H = \frac{n_1^4 + n_2^4 - n_1^2 n_2 - n_1 n_2^2}{n_1 n_2 (n_1 + n_2)(n_1^2 + n_2^2)} Y.$$

The denominator of the fraction is always positive. The numerator may be written $\theta^2 + 2n_1^2 n_2^2 - n_1^2 n_2 - n_1 n_2^2$, which is also always positive.

Hence the two-tier hierarchical organization is always associated with lower equilibrium rent-seeking expenditure than the corresponding flat organization.

The intuition for this result is the following. There are two effects at work lowering equilibrium expenditure under hierarchy relative to the flat organization.

- In equilibrium, the larger share of the surplus will end up in the less populated division, where it will be dissipated less.
- There is a free-rider problem at the top level of the game. Since the divisional share, given the contest structure, is a public good to the agents in a division, they will each spend relatively less than they would if the entire increment due to an individual contribution fell to the individual agent.

Wärneryd (1998) first showed this result, in the context of a discussion of federalism. Inderst *et al* (2007) consider its generalization to a larger class of contest success functions, while Inderst *et al* (2005) discuss *optimal* hierarchies. Münster (2007) analyses the role of decision order and endogeneity of the prize.

3 Leviathan and the nature of the firm

It seems natural to view the firm as a group of agents who produce something together. So why are not all firms organized as partnerships or cooperatives, i.e., owned by all the participants together? Certain types of firms, e.g., law firms and medical practices, are, indeed, typically organized like this. But why

is the most common form of ownership to have outside owners? As we shall see, the rent seeking or conflict perspective can shed some light on the issue.

As already noted, Coase argued that the firm avoids certain costs of transacting in the market, since transactions within the firm can be carried out by decree to fit the wishes of its owner. That is, the Coasian firm is characterized by the use of power or authority.

Alchian and Demsetz (1972) pointed out that this view of the firm overstates the power normally wielded by the owner. In reality, the firm seems to have no power beyond threatening to fire an employee. Since, similarly, an employee of the firm may threaten to leave it, this perspective does not explain how firm transactions are different from market transactions. Instead, Alchian and Demsetz argue, the existence of firms is explained by the *monitoring* problems that arise in joint production. Externalities in production give rise to problems of observing and measuring the individual contribution to a collective undertaking. Since participants cannot then be rewarded on the basis of individual efforts, the monitoring problem in turn leads to a free-riding problem. Hence there may be a need for an outsider, not directly involved in production, who performs monitoring of individual efforts. To have the correct incentives, this outsider should be a residual claimant, and thus becomes the firm's owner.

Holmström (1982) developed this reasoning further by pointing out that there will always be a free-riding problem if the entire surplus generated by the organization has to be shared among the participants. If the budget has to balance, as would normally be the case with the partnership model, it cannot be the case that each agent receives the value of his marginal contribution. Hence such an organization cannot provide the correct incentives for efficient production. In Holmström's view, the owner is an outsider who credibly threatens to remove resources in case the efficient production target fails to be met.

But from the point of view of the insiders of the firm, outside owners can also be viewed as a "common enemy" in the struggle to appropriate individual shares of the firm's surplus. Much like how Thomas Hobbes's Leviathan by presenting a greater threat causes citizens to behave more peacefully toward one

another, the outside owner can contribute to lowering the aggregate amount of resources spent on rent seeking in the firm, even though effort must now also be taken to prevent the outsider from confiscating the entire surplus. In the following, we shall consider this conflict perspective on firm ownership (based on Müller and Wärneryd 2001).

If managers in a firm cannot commit to a sharing rule in advance, there will be wasteful distributional conflict *ex post*. Introducing outside owners, whose only role is to take part in the distributional conflict against the managers as a collective, may be optimal, because it lessens the within-firm conflict. Unlike, e.g., the arguments of Holmström, this theory can explain why it may be optimal to have more than one outside owner. Furthermore, the analysis will suggest a framework for explaining why some firms are nevertheless partnerships.

3.1 *Partnerships*

Consider a firm that has m *managers*, which we shall sometimes also refer to as the *insiders*. The firm may also have workers, whose productive efforts are completely contractible. The production activity of the firm gives rise to a surplus Y after the workers have been paid. We shall assume that

$$Y := (1-\theta)\bar{y} + \theta \sum_{i=1}^{m} e_i,$$

where $\bar{y}$ is a constant, e_i is a firm-specific investment of manager i, and $\theta \in [0,1]$ is a parameter that measures the relative importance of managerial investments for the value of output.

For now (indeed throughout), we shall assume we have $\theta = 0$, i.e., that managerial investments have no effect on output.

We assume enforcement of property rights is imperfect and costly. Hence when the surplus Y first arrives, it is owned by nobody in particular, and each individual manager has to take costly action to acquire or safeguard a share of it. Such activities, for concreteness, may take the form of, e.g., on-the-job

consumption. That is, we assume the managers cannot agree in advance on a sharing rule, or, if they can agree on a sharing rule then it is still contestable. Consider the case of, for example, a law firm organized as a partnership. Empirically, such firms often officially have an egalitarian sharing rule, according to which the partners share what remains of the surplus, after deducting costs, equally among themselves. The cost-deduction part is key here. By manipulating costs, a partner in such a firm could in effect increase his relative share of the surplus, even though on the face of it everyone gets the same share—for instance, by reporting private consumption as costs associated with working with a client.

In particular, we assume that the utility of manager i, given safeguarding or rent-seeking expenditures r_j, is

$$u_i := \alpha_i Y - r_i,$$

where

$$\alpha_i := \begin{cases} r_i / \sum_j r_j & \text{if } \sum_j r_j > 0 \\ 1/m & \text{otherwise} \end{cases}$$

is manager is surplus share. Note that if nobody expends anything on rent seeking, then the default split is egalitarian.

By analogy with the previous discussion, there is a unique symmetric equilibrium where each manager expends

$$r^\star := \frac{m-1}{m^2} Y.$$

Hence total expenditures are $m r^\star = ((m-1)/m)Y$, and each manager gets utility Y/m^2 in equilibrium under the partnership model.

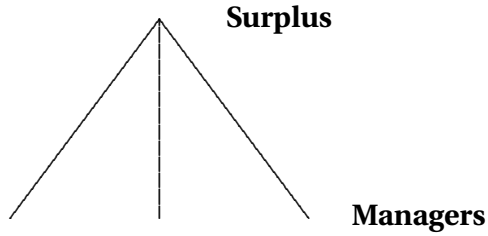
3.2 *Outside ownership*

Next assume the original partners of the firm could instead sell shares to one or more outside owners. Owning shares in a corporation does not directly entitle you to anything other than the right to go to shareholders' meetings. Since managers initially control the surplus, they can retain all of it through,

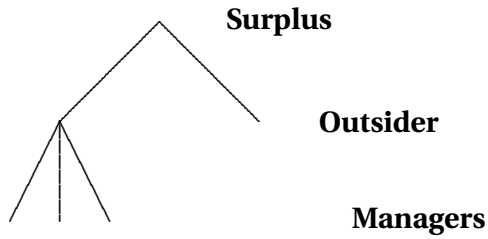
for example, accounting measures taken to hide it and internal diversions of resources leading to its consumption. Hence share ownership is most realistically thought of as the right of the outside owner to participate in a contest with the original managers for a slice of the cake. In order to get anything at all out of the firm, shareholders must exert costly effort.

As with the partnership, it is still the case that managers must take costly action to guarantee themselves a share of whatever remains in the firm, but under outside ownership they must also fight as a collective against the outside owner in order to retain as large a fraction as possible of the surplus within the firm.

That is, we are considering replacing the organizational structure of the partnership, which looks like this:



with one with an outside owner (or owners) that looks like this:



Hence if βY, with $\beta \in [0,1]$, is what remains in the firm after the outsiders get theirs, the final contest between insiders will yield each individual manager $\beta Y/m^2$, by straightforward analogy with the partnership case discussed above.

It seems natural to model the higher-level contest between outsiders and insiders analogously with the inside contest, with the single difference that the

share retained by the firm is a public good to the managers. We therefore assume that

$$\beta := \begin{cases} \sum_j s_j / (\sum_j s_j + \sum_k t_k) & \text{if } \sum_j s_j + \sum_k t_k > 0 \\ 1 & \text{otherwise,} \end{cases}$$

where s_i is the expenditure of manager i in the contest with outsiders and t_j is the corresponding expenditure of outside owner j. Note that, as seems reasonable, if the outsiders exert no effort at all, all of the surplus remains with the firm.

We assume the n owners own one share each. Each receives $1/n$ of the uncovered surplus of $(1-\beta)Y$ as a dividend payment. Hence owner is objective function, given the contest expenditures of the insiders and the other owners, is

$$u_i^o := \frac{1}{n}(1-\beta)Y - t_i,$$

and his first order condition for an optimal expenditure level is

$$\frac{\partial u_i^o}{\partial t_i} = \frac{\sum_j s_j}{\left(\sum_j s_j + \sum_k t_k\right)^2} \frac{Y}{n} - 1 = 0.$$

We note that since the surplus share is a public good to the owners, the first order condition only determines aggregate owner expenditure.

Similarly, the objective function of insider i is

$$u_i^m := \frac{\beta Y}{m^2} - s_i,$$

with corresponding first order condition

$$\frac{\partial u_i^m}{\partial s_i} = \frac{\sum_k t_k}{\left(\sum_j s_j + \sum_k t_k\right)^2} \frac{Y}{m^2} - 1 = 0.$$

As with the owners, we note that this condition only determines aggregate equilibrium expenditure on the part of the insiders.

As in the previous section, however, we shall focus on within-group symmetric equilibrium. That is, we shall assume all owners make the same expenditure t and all managers the same expenditure s. Hence the conditions for

equilibrium expenditure reduce to

$$\frac{ms}{(ms+nt)^2}\frac{Y}{n}-1=0$$

and

$$\frac{nt}{(ms+nt)^2}\frac{Y}{m^2}-1=0.$$

Solving this system of simultaneous equations for s and t, we have that

$$s=\frac{n}{m(m^2+n)^2}Y$$

and

$$t=\frac{m^2}{n(m^2+n)^2}Y.$$

Total expenditure on rent-seeking activities by all agents, taking into account the expenditures made by the managers in fighting for individual shares of the surplus retained in the firm, is then

$$ms+nt+\frac{m-1}{m}\frac{n}{m^2+n}Y=\frac{m-n+mn}{m(m^2+n)}Y.$$

This quantity is strictly less than total rent-seeking costs under inside ownership, $((m-1)/m)Y$, for all $m>1$ and $n\geq 1$. In the limit, however, as n approaches infinity, it approaches the cost of inside ownership. Thus having many owners is just like having none, as free-riding among the outsiders completely cancels their efforts.

Much like before, the intuition for the drop in rent-seeking costs as a result of outside ownership lies in two interacting effects.

- The public good nature of the firm's share of surplus induces a free-rider problem for the managers, leading to under-contribution relative to what would have been collectively optimal.

- Since the outsiders will always make positive expenditure in equilibrium, less than the entire surplus will be retained in the firm. Hence each individual manager's share will be worth less in the end, making for lower expenditure in the internal fight among managers.

Assuming capital markets are competitive, potential outsiders can be made to pay exactly their expected value for a share in the firm, taking into account the subsequent distributional conflict. Hence each share is sold at a price of $(m^2(m^2+n-1))Y/(n(m^2+n)^2)$. Assuming the insiders split the proceeds from share sales equally, they each have an *ex ante* utility (adding the share proceeds to the utility of the two levels of ensuing contests) of $(m^3-m+n)Y/(m^2(m^2+n))$, which, as expected, is strictly greater than their total individual utility Y/m^2 under inside ownership.

We have seen how introducing outside owners may lower rent-seeking costs in the firm. This happens even though we assume outside owners have no control rights, and, indeed, only serve to remove part of the surplus from the firm.

So far, however, we have assumed that the size of the firm's surplus is fixed and independent of any activities on the part of managers. Things may be different if managers have to be provided with incentives to make firm-specific investments *ex ante*. Since managers receive a smaller share of the total surplus when there are outside owners, their incentives to make firm-specific investments are dulled. There is a *holdup* problem. Hence in choosing an optimal ownership structure, there is a tradeoff between minimizing rent-seeking costs and providing investment incentives.

Empirically, the partnership or cooperative form of firm organization is often found in, for example, law firms and medical practices. What these industries have in common may be the importance of incontractible human capital investments by partners. It is precisely in such cases that the rent-seeking theory of firm ownership suggests that the tradeoff between minimizing conflict costs and providing incentives should favor the partnership model.

References

Alchian, Armen A. and Harold Demsetz (1972), 'Production, information costs, and economic organization', *American Economic Review*, **62**(5), 777–795.

Chandler, Jr, Alfred D. (1962), *Strategy and Structure: Chapters in the History of*

the American Industrial Enterprise, New York, NY: Doubleday & Co.

Coase, Ronald H. (1937), 'The nature of the firm', *Economica*, **4**(16), 386–405.

Holmström, Bengt (1982), 'Moral hazard in teams', *Bell Journal of Economics*, **13**(2),324–340.

Inderst, Roman, Holger M. Müller and Karl Wärneryd (2005), 'Influence costs and hierarchy', *Economics of Governance*, **6**(2), 177–197.

Inderst, Roman, Holger M. Müller and Karl Wärneryd (2007), 'Distributional conflict in organizations', *European Economic Review*, **51**(2), 385–402.

Meyer, Margaret, Paul Milgrom and John Roberts (1992), 'Organizational prospects, influence costs, and ownership changes', *Journal of Economics & Management Strategy*, **1**(1), 9–35.

Milgrom, Paul and John Roberts (1990), 'Bargaining costs, influence costs, and the organization of economic activity', in James E. Alt and Kenneth A. Shepsle (eds), *Perspectives on Positive Political Economy*, Cambridge, UK: Cambridge University Press, pp. 57–89 .

Müller, Holger M. and Karl Wärneryd (2001), 'Inside vs outside ownership: A political theory of the firm', *RAND Journal of Economics,* **32**(3), 527–541; reprinted in Roger D. Congleton, Arye L. Hillman, and Kai A. Konrad (eds) (2008), *40 Years of Research on Rent Seeking 2: Applications: Rent Seeking in Practice*, Heidelberg: Springer, pp. 679–693.

Münster, Johannes (2007), 'Simultaneous inter- and intra-group conflicts', *Economic Theory*, **32**(2), 333–352.

Scharfstein, David S. and Jeremy C. Stein (2000), 'The dark side of internal capital markets: Divisional rent-seeking and inefficient investment', *Journal of Finance*, **55**(6), 2537–2564; reprinted in Roger D. Congleton, Arye L. Hillman, and Kai A. Konrad (eds) (2008), *40 Years of Research on Rent Seeking 2: Applications: Rent Seeking in Practice*, Heidelberg: Springer, pp. 621–648.

Skaperdas, Stergios (1996), 'Contest success functions', *Economic Theory*, **7**(2), 283–290; reprinted in Roger D. Congleton, Arye L. Hillman, and Kai A. Konrad (eds) (2008), *40 Years of Research on Rent Seeking 1: Theory of Rent Seeking*, Heidelberg: Springer, pp. 263–270.

Tullock, Gordon (1967), 'The welfare costs of tariffs, monopolies, and theft', *Western Economic Journal*, **5**(3), 224–232; reprinted in Roger D. Congleton, Arye L. Hillman, and Kai A. Konrad (eds) (2008), *40 Years of Research on Rent Seeking 1: Theory of Rent Seeking*, Heidelberg: Springer, pp. 45–53.

Tullock, Gordon (1980), 'Efficient rent seeking', in James M. Buchanan, Robert D. Tollison and Gordon Tullock (eds), *Toward a Theory of the Rent-Seeking Society*, College Station, Texas: Texas A&M University Press, pp. 269–282; reprinted in Roger D. Congleton, Arye L. Hillman, and Kai A. Konrad (eds) (2008), *40 Years of Research on Rent Seeking 1: Theory of Rent Seeking*, Heidelberg: Springer, pp. 105–120.

Wärneryd, Karl (1998), 'Distributional conflict and jurisdictional organization', *Journal of Public Economics*, **69**(3), 435–450.