Toward a Theory

OF THE

Rent-Seeking Society

Edited by

JAMES M. BUCHANAN, ROBERT D. TOLLISON,

and GORDON TULLOCK

Texas A&M University Press

COLLEGE STATION

Library of Congress Cataloging in Publication Data

Main entry under title:

Toward a theory of the rent-seeking society.

(Texas A & M University economics series; no. 4)

Includes bibliographical references.

1. Rent (Economic theory)—Addresses, essays, lectures. 2. Transfer payments—Addresses, essays, lectures. 3. Industry and state—Addresses, essays, lectures. I. Buchanan, James M. II. Tollison, Robert D. III. Tullock, Gordon. IV. Title: Rent-seeking society. V. Series: Texas A & M University, College Station. Texas A & M University economics series; no. 4.

HB401.T68 333′.012 79-5276

ISBN 0-89096-090-9

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Preface

TITLES are important, all the more so when the object of a book is to introduce a new subject matter to one's fellow economists and other interested social scientists. *Rent seeking* is a term that was introduced to economics by Anne O. Krueger, whose paper on this subject is reprinted in this collection, and it is meant to describe the resource-wasting activities of individuals in seeking transfers of wealth through the aegis of the state. The modern literature on rent seeking, to our knowledge, dates from Gordon Tullock's 1967 paper in the *Western Economic Journal*, which is also reprinted in this volume. Although rent seeking will normally arise in the context of artificial interferences with markets by the state, this is not the only setting in which rent seeking may occur. Indeed, the issue of the boundaries of the domain of rent-seeking behavior, as several of the following essays will argue, is not fully resolved at this point. As we say, this book is "toward" a theory and not a final statement of a theory.

Moreover, as with most economic analysis, the reader will find a blending of positive and normative elements of analysis in the papers presented here. Many of the scholars who contributed to this volume will offer positive-predictive analyses of the course of rent-seeking activities in the economy. What features of legislatures explain, for example, the success of interest groups in obtaining legislation favorable to their cause? Other authors have as their main interest the development of the equilibrium properties of the rent-seeking society and an assessment of the degree to which the rent-seeking society deviates from the economists' "optimal" configuration of the economy.

To repeat, however, we are not offering here a definitive analysis of rent seeking. We are offering something analogous to a travel guide, such as it is, to those scholars who might be attracted to work in this area. Indeed, our guide does not even provide a good road map. We are dealing here with wilderness territory, and though we feel sure that there is plenty of clear water and virgin timber in the wilderness, the best we can do for now is to offer the reader some good stopping places along the way.

We should stress that we canvassed carefully for the papers in this collection, both from previously published and unpublished sources. We should not, however, be surprised if we have missed some relevant and applicable papers. We do not present this book as an exhaustive collection of papers on rent seeking, an attempt that in itself would be wholly inappropriate for an emerging area of study. Our objective is quite different: to generate new interest in rent seeking, interest that will stimulate further work.

We would also like to express our appreciation to those of our colleagues at the Center for Study of Public Choice at Virginia Polytechnic Institute and State University who have helped in the preparation of this book: Donna Trenor, George Uhimchuk, Iris Bowman, and Betty Ross, without whose efforts the project should have surely faltered.

Several of the chapters that follow are reprints of papers already published. These papers appear as they did in their original sources of publication, except for minor stylistic changes. Permission to reprint has been granted by the holders of the copyright in each case. Needless to say, we appreciate the cooperation of the various authors and publishers in allowing us to reprint these papers.

"The Welfare Costs of Tariffs, Monopolies, and Theft," by Gordon Tullock, originally appeared in the *Western Economic Journal* (now *Economic Inquiry*) 5 (June, 1967): 224–232, and is reprinted by permission of the publisher. Anne O. Krueger's paper, "The Political Economy of the Rent-Seeking Society," originally appeared in the *American Economic Review* 64 (June, 1974): 291–303, and is reprinted with the permission of the author and the publisher. The paper by Richard A. Posner, "The Social Costs of Monopoly and Regulation," originally appeared in the *Journal of Political Economy* 83 (August, 1975): 807–827, and is reprinted with the permission of the author and the University of Chicago Press.

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The paper by Harold Demsetz, "Economics as a Guide to Antitrust Regulation," originally appeared in the *Journal of Law and Economics* 19 (August, 1976): 371–384, and is reprinted with the permission of the author and the University of Chicago Law School. "The Transitional Gains Trap," by Gordon Tullock, first appeared in *The Bell Journal of Economics* 6 (Autumn, 1975): 671–678, and is reprinted by permission from the publisher. Tullock's paper, "The Cost of Transfers," originally was published in *Kyklos* 4 (December, 1971): 629–643, and is reprinted with the permission of the publisher. Edgar K. Browning's paper, "On the Welfare Cost of Transfers," appeared in *Kyklos* 2 (April, 1974): 374–377, and is reprinted by permission of author and publisher. Tullock's paper, "More on the Cost of Transfers," also appeared in *Kyklos* 2 (April, 1974): 378–381, and is reprinted by permission of the publisher. Michael L. Goetz's paper, "Tax Avoidance, Horizontal Equity, and Tax Reform: A Proposed Synthesis," originally appeared in the *Southern Economic Journal* 44 (April, 1978): 798–812, and is reprinted by permission of author and publisher.

6

Efficient Rent Seeking

by

GORDON TULLOCK

MOST of the papers in this volume implicitly or explicitly assume that rent-seeking activity discounts the entire rent to be derived. Unfortunately, this is not necessarily true; the reality is much more complicated. The problem here is that the average cost and marginal cost are not necessarily identical.

This is surprising because in competitive equilibrium the average cost and marginal cost are equal and rent seeking is usually a competitive industry. If marginal cost is continuously rising, then marginal and average cost will be different.[1] In the ordinary industry the average cost curve of an individual enterprise is usually U-shaped, with economies of scale in the early range and diseconomies of scale in the latter range. In equilibrium, the companies will be operating at the bottom of this cost curve, and therefore average and marginal costs will be equated.

A second and much more important reason for the equality of marginal and average cost is that if there is some resource used in production of anything produced under continuously rising costs, then the owners of that resource will charge the marginal cost. People engaged in manufacturing (or whatever activity with which we are dealing) will face a cost that incorporates these rents of the original factor owners. Thus, the assumption that the costs are constant over scale is suitable for practical use.

Unfortunately, both these reasons are of dubious validity in the case of rent seeking. First, there seem to be no particular economies of scale. As far as we can see, for example, such monster industries as big

[1] This is obviously also true if marginal cost is continuously falling.

oil and the natural gas producers do not do as well in dealing with the government as do little oil or, in the gas case, householders. In general, it would appear that there is no range of increasing returns in rent seeking. However, this is admittedly an empirical problem and one for which, at the moment, we have little data. It is, in any event, dangerous to assume that the curves are all U-shaped and competition will adjust us to the minimum point of these curves. This is particularly so, since there is no obvious reason why all rent seekers should have identical efficiencies.

The second and more important reason why we can normally assume that supply curves are, in the long run, flat is that if they are continuously rising, factory owners can generally achieve the full rent by selling their factors at their marginal value; hence, the enterprises face essentially flat supply prices. Unfortunately, this has only a limited application in rent seeking. Suppose, for example, that we organize a lobby in Washington for the purpose of raising the price of milk and are unsuccessful. We cannot simply transfer our collection of contacts, influences, past bribes, and so forth to the steel manufacturers' lobby. In general, our investments are too specialized, and, in many cases, they are matters of very particular and detailed good will to a specific organization. It is true that we could sell the steel lobby our lobbyists with their connections and perhaps our mailing list. But presumably all these things have been bought by us at their proper cost. Our investment has not paid, but there is nothing left to transfer.

Similarly, the individual lobbyist spends much time cultivating congressmen and government officials and learning the ins and outs of government regulations. There is no way he can simply transfer these contacts, connections, and knowledge to a younger colleague if he wishes to change his line of business. The younger colleague must start at the bottom and work his way up. Thus, it seems likely that in most rent-seeking cases, the supply curve slants up and to the right from its very beginning. This means that rent-seeking activities are very likely to have different marginal and average costs, even if we can find an equilibrium.

It might seem that with continuously upward sloping supply curves and a competitive industry, there would be no equilibrium. This turns out not to be true, although the equilibrium is of a somewhat unusual nature. The analytical tools required to deal with it are drawn more from game theory than from classical economics.

In my article, "On the Efficient Organization of Trials,"[2] I introduced a game that I thought had much resemblance to a court trial or, indeed, to any other two-party conflict. In its simplest form, we assume two parties who are participating in a lottery under somewhat unusual rules. Each is permitted to buy as many lottery tickets as he wishes at one dollar each, the lottery tickets are put in a drum, one is pulled out, and whoever owns that ticket wins the prize. Thus, the probability of success for A is shown in equation (1), because the number of lottery tickets he holds is amount A and the total number in the drum is $A + B$.

$$P_A = \frac{A}{A + B} \tag{1}$$

In the previously cited article, I pointed out that this model could be generalized by making various modifications in it, and it is my purpose now to generalize it radically.[3]

Let us assume, then, that a wealthy eccentric has put up \$100 as a prize for the special lottery between A and B. Note that the amount spent on lottery tickets is retained by the lottery, not added onto the prize. This makes the game equivalent to rent seeking, where resources are also wasted.

How much should each invest? It is obvious that the answer to this question, from the standpoint of each party, depends on what he thinks the other will do. Here, and throughout the rest of this paper, I am going to use a rather special assumption about individual knowledge. I am going to assume that if there is a correct solution for individual strategy, then each player will assume that the other parties can also figure out what that correct solution is. In other words, if the correct strategy in this game were to play \$50, each party would assume that the other was playing \$50 and would only buy fifty tickets for himself, if that were the optimal amount under those circumstances.

[2] Gordon Tullock, "On the Efficient Organization of Trials," *Kyklos* 28 (1975): 745–762.

[3] For a previous generalization of the model and an application to arms races, see Gordon Tullock, *The Social Dilemma: The Economics of War and Revolution* (Blacksburg, Va.: Center for Study of Public Choice, 1974), pp. 87–125.

As a matter of fact, the optimal strategy in this game is not to buy \$50.00 worth of tickets but to buy \$25.00. As a very simple explanation, suppose that I have bought \$25.00 and you have bought \$50.00. I have a one in three chance of getting the \$100.00 and you have a two in three chance. Thus, the present value of my investment is \$33.33 and the present value of yours is \$66.66, or, for this particular case, an equal percentage gain. Suppose, however, that you decided to reduce your purchases to \$40.00 and I stayed at \$25.00. This saves you \$10.00 on your investment, but it lowers your present value of expectancy to only \$61.53 and you are about \$5.00 better off. Of course, I have gained from your reduction, too.

You could continue reducing your bet with profit until you also reached \$25.00. For example, if you lowered your purchase from \$26.00 to \$25.00, the present value of your investment would fall from \$50.98 to \$50.00, and you would save \$1.00 in investment. Going beyond \$25.00, however, would cost you money. If you lowered it to \$24.00, you would reduce the value of your investment by \$1.02 and only save \$1.00. It is assumed, of course, that I keep my purchase at \$25.00.

I suppose it is obvious from what I have said already that \$25.00 is equilibrium for both, that is, departure from it costs either one something. It is not true, however, that if the other party has made a mistake, I maximize my returns by paying \$25.00. For example, if the other party has put up \$50.00 and I pay \$24.00 instead of \$25.00, I save \$1.00 in my investment but reduce my expectancy by only \$0.90. My optimal investment, in fact, is \$17.00. However, if we assume a game in which each party knows what the other party has invested and then adjusts his investment accordingly, the ultimate outcome must be at approximately \$25.00 for each party.[4] The game is clearly a profitable one to play, and, in fact, it will impress the average economist as rather improbable. However, it is a case in which inframarginal profits are made, although we are in marginal balance. At first glance, most people feel that the appropriate bet is \$50.00, but that is bringing the

[4] It would make no difference in the reasoning here, or in any of the following work, if there were an insurance company always willing to buy a bid at its true actuarial value. For example, if you had put in \$25.00 and the other party had also put in \$25.00, it would give you \$50.00 for it, and if you had put in \$26.00 and the other party \$25.00, it would give you \$50.98. But rent seeking normally involves risk, and hence I have kept the examples in the risky form.

total return into equality with the total cost rather than equating the margins.

To repeat, this line of reasoning depends on the assumption that the individuals can figure out the correct strategy, if there is a correct strategy, and that they assume that the other people will be able to figure it out, also. It is similar to the problem that started John von Neumann on the invention of game theory, and I think it is not too irrational a set of assumptions if we assume the kind of problem that rent seeking raises.

But there is no reason why the odds in our game should be a simple linear function of contributions. For example, they could be an exponential function, as in equation (2):

$$P_A = \frac{A^r}{A^r + B^r}. \tag{2}$$

There are, of course, many other functions that could be substituted, but in this paper we will stick to exponentials.

It is also possible for more than two people to play, in which case we would have equation (3):

$$P_A = \frac{A^r}{A^r + B^r, \ldots, n^r}. \tag{3}$$

The individuals need not receive the same return on their investment. Indeed, in many cases we would hope that the situation is biased. For example, we hope that the likelihood of passing a civil service examination is not simply a function of the amount of time spent cramming, but that other types of merit are also important. This would be shown in our equations by some kind of bias in which one party receives more lottery tickets for his money than another.

We will begin by changing the shape of the marginal cost curve and the number of people playing, and leave bias until later. Table 6.1 shows the individual equilibrium payments by players of the game, with varying exponents (which means varying marginal cost structures) and varying numbers of players. Table 6.2 shows the total amount paid by all of the players, if they all play the equilibrium strategy.

I have drawn lines dividing these two tables into zones I, II, and III. Let us temporarily confine ourselves to discussing zone I. This is the zone in which the equilibrium price summed over all players leads

TABLE 6.1
Individual Investments
(N–person, No Bias, with Exponent)

Exponent	Number of Players: 2	4	10		15
1/3	8.33	6.25	3.00		2.07
1/2	12.50	9.37	4.50	I	3.11
1	25.00	18.75	9.00		6.22
2	50.00	37.50	18.00		12.44
3	75.00	56.25	27.00		18.67
5	125.00	93.75	45.00	II	31.11
8	200.00	150.00	72.00		49.78
12	300.00	225.00 III	108.00		74.67

TABLE 6.2
Sum of Investments
(N–Person, No Bias, with Exponent)

Exponent	Number of Players: 2	4	10	15		Limit
1/3	16.66	25.00	30.00	31.05		33.30
1/2	25.00	37.40	45.00	46.65	I	50.00
1	50.00	75.00	90.00	93.30		100.00
2	100.00	150.00	180.00	186.60		200.00
3	150.00	225.00	270.00	280.05		300.00
5	250.00	375.00	450.00	466.65	II	500.00
8	400.00	600.00	720.00	746.70		800.00
12	600.00	900.00	1,080.00 III	1,120.05		1,200.00

to a payment equal to or less than the total price. In other words, these are the games in which expectancy of the players, if they all play, would be positive. Although we will start with these games, as we shall see below there are cases in which we may be compelled to play games in zones II and III where the expectancy is negative.

If we look at zone I, it is immediately obvious that the individual payments go down as the number of players rises, but the total amount paid rises. In a way, what is happening here is that a monopoly profit is being competed away. Note, however, when the exponent is one-third or one-half, even in the limit there is profit of $66.66 or $50.00 to the players taken as a whole. Thus, some profit remains. With the cost curve slanting steeply upward, these results are to some extent counterintuitive. One might assume that with a positive return on investment, it will always be sensible for more players to enter, thereby driving down the profits. In this case, however, each additional player lowers the payments of all the preceding players and his own, and the limit as the number of players goes to infinity turns out to be one where that infinity of players has, at least in expectancy terms, sizable profits.

Throughout the table, in zones I, II, and III, individual payments go down as we move from left to right, and total payments rise. We can deduce a policy implication from this, although it is a policy implication to which many people may object on moral grounds. It would appear that if one is going to distribute rents, nepotism is a good thing because it reduces the number of players and, therefore, the total investment. This is one of the classical arguments for hereditary monarchies. By reducing the number of candidates for an extremely rent-rich job to one, you eliminate such rent-seeking activities as civil war, assassination, and so forth. Of course, there are costs here. If we reduce the number of people who may compete for a given job, you may eliminate the best candidate or even the best two thousand candidates. This cost must be offset against the reduction in rent-seeking costs.

On the other hand, many cases of rent seeking are not ones in which we care particularly who gets the rent. In such matters as government appointments where there are large incomes from illegal sources, pressure groups obtaining special aid from the government, and so on, we would prefer that there be no rent at all, and, if there must be rent, it does not make much difference to whom it goes. In these cases, clearly measures to reduce rent seeking are unambiguous gains. Thus, if Mayor Richard Daley had confined all of the more lucrative appointments to his close relatives, the social savings might have been considerable.

If we go down the table, the numbers also steadily rise. Looking at two players, for example, from an exponent of one-third, which represents an extremely steeply rising cost curve, to an exponent of two, which is much flatter, we get a sixfold increase in the individual and total payments. This also suggests a policy conclusion. On the whole, it would be desirable to establish institutions so that the marginal cost is very steeply rising. For example, civil servants' examinations should be, as far as possible, designed so that the return on cramming is low, or, putting it another way, so that the marginal cost of improving one's grade is rapidly rising. Similarly, it is better if the political appointments of the corrupt governments are made quickly and rather arbitrarily, so that not so many resources are invested in rent seeking.

Once again, however, there is a cost. It may be hard to design civil service examinations so that they are difficult to prepare for and yet make efficient selections.[5] Here again, if we are dealing with appointments to jobs that we would rather not have exist, the achievement of profits through political manipulations and the like, there is no particular loss in moving down our table. Thus, laws that make it more expensive or more difficult to influence the government—such as the campaign contribution laws—may have considerable net gain by making the rise in marginal cost steeper. There is a considerable expense involved, however. The actual restrictions placed on campaign contributions are designed in a highly asymmetrical manner, so that they increase the cost for some potential lobbyists and not for others. Whether there is a net social gain from this process is hard to say.

So much for zone I; let us now turn to zones II and III. In zone II, the sum of the payments made by the individual players is greater than the prize; in other words, it is a negative-sum game instead of a positive-sum game as in zone I. In zone III, the individual players make payments that are higher than the prize. It might seem obvious that no one would play games of this sort, but, unfortunately, this is not true.

Before von Neumann began his work on the theory of games, students of probability divided gambling situations into two categories: pure chance and games of strategy. We may take two simple examples. If Smith flips a coin and Jones calls the outcome, we have a game of pure chance, provided only that Smith does not have enough skill ac-

[5] There is another solution, which is to put the civil service salary at the same level as equivalent private salaries. Under these circumstances, there would be no rent seeking. Given the political power of civil servants, however, I doubt that this would be possible.

tually to control the coin. This is so even if the coin is not a fair one, although Jones might not properly calculate the odds under those circumstances. In this game, the properly calculated, but mathematical, odds are fifty-fifty, and there is no great problem.

Consider, however, a very similar game, in which Smith chooses which side of the coin will be up and covers it with his hand until Jones calls either heads or tails. The coin is then uncovered, and if Jones has properly called the bet, Smith pays him; if he has not, Jones pays Smith. This is a game of strategy. The early writers in this case reasoned that there was no proper solution to the game, because if there were a proper solution, both parties could figure it out. Thus, for example, if the proper thing for Smith to do was to play heads, he would know that Jones would know that this was the proper thing to do; hence, the proper thing for Smith to do would be to play tails. Of course, if the proper thing is to play tails, then Jones will also know that; therefore, the proper thing to do is to play heads. It will be seen that this is an example of the paradox of the liar.

The early students of probability argued that in circumstances like these there was no proper solution and referred to it as a game of strategy, which was roughly equivalent to throwing up their hands. In games of this sort, von Neumann discovered that there might be (not necessarily was, but might be) a solution. In the particular case of coin matching, there is no simple solution, but in many real-world situations there could be a strategy for Smith that he would still retain even though Jones could figure it out and make the best reply.

If there was such a strategy, it was called a saddle point. Von Neumann also pointed out that one should consider not only pure strategies but also mixed strategies. Further, in zero-sum games there is always some mixed strategy that has a saddle point. This proof can also be extended to differential games, which are the kind of games we are now discussing, but, unfortunately, it applies only to zero-sum games, and our games are not zero-sum.[6]

A broader concept of equilibrium was developed by Nash, but unfortunately the games in zones II and III have a very pronounced discontinuity at 0. In consequence, there is no Nash equilibrium. These games have neither dominant pure strategies, saddle points, nor domi-

[6] Except, of course, for those games which lie along the boundary between zone I and zone II.

nant mixed strategies. They are games of strategy in the older sense of the word, games for which we can offer no solution.

Let us here reexamine the idea of a solution in order to make this clear. If there is such a solution, anyone can compute it. Thus, Smith must choose his strategy knowing that Jones will know what he is going to do. Similarly, Jones must choose knowing that Smith will be able to predict accurately what he will do. There is no law of nature that says all games will have solutions of this sort, and these, unfortunately, are in a category that do not.

For a simple example, consider the game shown on table 6.1 in which there are two players, Smith and Jones again, and assume that the exponent on the cost function is 3. The individual payment is shown as $75, and the result of the two players putting up $75 is that they will jointly pay $150 for $100. Each is paying $75 for a fifty-fifty chance on $50, which appears to be stupid.

However, let us run through the line of reasoning that may lead the two parties to a $75 investment. Suppose, for example, that we start with both parties at $50. Smith raises to $51. With the exponent of three, the increase in the probability that he will win is worth more than $1—in fact, considerably more. If Jones counters, he also gains more than $1 by his investment. By a series of small steps of this sort, each one of which is a profitable investment, the two parties will eventually reach $75, at which point there is no motive for either one to raise or lower his bid by any small amount. They are in marginal adjustment, even though the total conditions are very obviously not satisfied.

But what of the total conditions? For example, suppose that Jones decides not to play. Obviously, his withdrawal means that Smith is guaranteed success, and, indeed, he will probably regret that he has $75 down rather than $1, but, still, he is going to make a fairly good profit on his investment.

Here we are back in the trap of the coin-matching games. If the best thing to do, the rational strategy, in this game is not to play, then obviously the sensible thing to do is to put in $1. On the other hand, if the rational strategy is to play, and one can anticipate the other party will figure that out, too, so that he will invest, then the rational thing to do is to stay out, because you are going to end up with parties investing at $75. There is no stable solution.

Games like this occur many times in the real world. Poker, as it is actually played, is an example, and most real-world negotiations are also examples of this sort of thing; in the case of poker, there is no social waste, because the parties are presumably deriving entertainment from the game. Negotiations, although they always involve at least some waste, may involve fairly small amounts because the waste involved in strategic maneuvering may be more than compensated by the transfer of information that may permit achievement of a superior outcome. But in our game this is not possible. In the real world there may be some such effect that partially offsets the waste of the rent seeking. In most rent-seeking cases, however, it is clear that this offset is only partial, and in many cases of rent seeking the activity from which the rent will be derived is, in and of itself, of negative social value. Under these circumstances, not only do we have the waste of rent seeking, we also have the net social waste imposed by the rent itself.

In the real world, the solution to rent seeking is rather apt to end up at $75 in our particular case instead of at zero, because normally the game does not permit bets, once placed, to be withdrawn. In other words, the sunk costs are truly sunk; you cannot withdraw your bid. For example, if I decide to cram for an examination or invest a certain amount of money in a lobby in Washington that is intended to increase the salaries of people studying public choice, once the money is spent, I cannot get it back. If it turns out that I am in this kind of competitive game, the sunk-cost aspect of the existing investment means that I will continue making further investments in competition with other people studying for the examination or in hiring lobbyists. In a way, the fact that there is an optimal amount—that even with the previous costs all sunk we will not go beyond $75 in the particular example we are now using—is encouraging. Although sunk costs are truly sunk, there is still a limit to the amount that will be invested in the game.

Note that this game has a possible precommitment strategy.[7] If one of the parties can get his $75 in first and make it clear that it will not be withdrawn, the sensible policy for the second party is to play zero; hence, the party who precommits makes, on this particular game, a profit of $25.

[7] Thomas C. Schelling, *The Strategy of Conflict* (Cambridge, Mass.: Harvard University Press, 1960).

Unfortunately, this analysis, although true, is not very helpful. It simply means that there is another precommitment game played. We would have to investigate the parameters of that game, as well as the parameters of the game shown in tables 6.1 and 6.2, and determine the sum of the resources invested in both. Offhand, it would appear that most precommitment games would be extremely expensive because it is necessary to make large investments on very little information. You must be willing to move before other people, and this means moving when you are badly informed.[8] But, in any event, this precommitment game would have some set of parameters, and, if we investigate them and then combine them with the parameters of the game that you precommit, we would obtain the total cost. I doubt that this would turn out to be a low amount of social waste.

The situation is even more bizarre in zone III. Here the equilibrium involves each of the players' investing more than the total prize offered. It is perhaps sensible to reemphasize the meaning of the payments shown in table 6.1. They are the payments that would be reached if all parties, properly calculating what the others would do, made minor adjustments in their bids and finally reached the situation where they stopped in proper marginal adjustment. They are not in total equilibrium, of course.

Once again, the simple rule—do not play such games—is not correct, because if it were the correct rule, then anyone who violated it could make large profits. Consider a particular game invented by Geoffrey Brennan, which is the limit of table 6.1 as the exponent is raised to infinity. In this game, $100 is put up and will be sold to the highest bidder, but all the bids are retained, that is, when you put in a bid, you cannot reduce it. Under these circumstances, no one would put in an initial bid of more than $100, but it is not at all obvious what one *should* put in. Further, assume that the bids, once made, cannot be withdrawn but can be raised. Under these circumstances, there is no equilibrium maximum bid. In other words, it is always sensible to increase your bid above its present level if less than $100 will make

[8] As an amusing sidelight on this problem, a referee of an earlier draft of this paper objected to my above paragraph on the ground that the first party should not put in $75 but some smaller number closer to $55 that would be enough to bar the other party. Note, however, that if one paused to figure out the actual optimal number, the other party would get in first with his $75.

you the highest bidder. The dangers are obvious, but it is also obvious that refusal to play the game is not an equilibrium strategy, because of the paradox of the liar mentioned above.

In games in zones II and III, formal theory can say little. Clearly, these are areas where the ability to guess what other people will do, interpret facial expressions, and so on, pays off very highly. They are also areas where it is particularly likely that very large wastes will be incurred by society as a whole. Unfortunately, it seems likely that rent seeking is apt to lead to these areas in some cases.

Obviously, as a good social policy, we should try to avoid having games that are likely to lead to this kind of waste. Again, we should try to arrange that the payoff to further investment in resources is comparatively low, or, in other words, that the cost curve points sharply upward.

One way to lower the social costs is to introduce bias into the selection process. Note that we normally refer to bias as a bad thing, but one could be biased in the direction of the correct decision. For example, a civil service exam might be so designed that it is very likely to pick out people who have the necessary natural traits and is very hard to prepare for. This would be bias in favor of the appropriate traits, but it would be a desirable thing. Similarly, we would like to have court proceedings biased in such a way that whoever is on the right side need not make very large investments in order to win, and if this is true, the people on the wrong side will not make very large investments either, because they do not pay.

On the other hand, bias can be something which, at least morally, is incorrect. We referred above to Mayor Daley's appointments of his relatives, and this would be a kind of bias. In that particular case, presumably bias would reduce total rent seeking and not lower the functional efficiency of the government of Chicago, but there are many cases where this kind of bias *would* lower efficiency.

Bias, it will be seen, is rather similar to the restriction on the number of players we have discussed above. Instead of totally cutting off some players, we differentially weigh the players. For example, assume that player A is given five times as many coupons for his one-dollar investment as are the other players. This would bias the game in his favor, although not to the extreme of prohibiting others from buying tickets. This kind of bias, once again, is rather similar to designing

TABLE 6.3
Individual Investments
(2-Party, Bias, Exponent)

	Bias					
Exponent	2	4		10		15
1	22.22	16.00		8.30		5.90
2	44.44	32.00	I	16.53		11.72
3	66.67	48.00		24.79		17.58
5	111.11	80.00		41.32		29.30
8	177.78	128.00		66.12	II	46.88
12	266.67	192.00	III	99.17		70.31

your examination to select natural traits. If player *A* can, with one hour of cramming, increase his probable score on a civil service exam as much as can player *B* with five hours of cramming, then the system is biased in favor of *A*, and we would anticipate that the total cost of rent seeking would go down.

Let us now turn to table 6.3. In this table, we have only two parties competing because the situation is mathematically complex and, in any event, having more than two parties would require a three-dimensional diagram. Along the top is the degree of bias toward one player, which is measured here simply in the number of tickets he gets per dollar, it being assumed that the less-advantaged player gets one ticket per dollar. We have omitted the lower exponents of table 6.1, because it is immediately obvious that bias very sharply reduces total rent seeking.

Table 6.4 is the sum over both players of all the payments shown in table 6.3, and, in this case, they always just double the figures in table 6.3.

It turns out that, using our simple mathematical apparatus, both players—the one who is favored by the bias and the one who is not—make the same investment. This is a little counterintuitive, but not very, since most of us do not have very strong intuitions on these matters. In any event, it may simply be an artifact of the particular mathematical formalism we have chosen.

It will be noted immediately that zone I is much larger in this case than in the unbiased cases of tables 6.1 and 6.2. Indeed, even with an

TABLE 6.4
Sum of Investments
(2-Party, Bias, Exponent)

	Bias					
Exponent	2	4		10		15
1	44.44	32.00		16.60		11.80
2	88.88	64.00	I	30.06		23.44
3	133.34	96.00		49.58		35.16
5	222.22	160.00		82.64		58.60
8	355.56	256.00		132.24		93.76
12	533.34	384.00	III	198.34	II	140.62

exponent of 8—which means an extremely flat cost curve—a bias of 15 leads to the game still being in zone I. Thus, such bias does pay off heavily in reducing rent seeking.

It is also true that this kind of bias, in general, is easier to arrange by socially desirable techniques than the earlier suggestions made to reduce rent seeking. Once again, designing personnel selection procedures so that they select the best man at relatively low cost to him is an example. Another would be some kind of policy selection process that was heavily biased in favor of efficient, or "right," policies. Both these techniques, if we could design them, would have large payoffs, not only in reducing rent-seeking activity but also in increasing efficiency of government in general. Thus, it seems to me that introducing this rather special kind of bias into rent seeking would be desirable in many areas, even if we ignore the rent-seeking savings.

However, for many rent-seeking activities, it is admittedly very hard to find a way to introduce bias at all or to introduce bias in a way that leads to better outcomes. Once again, if we assume that Mayor Daley does not restrict his appointments to his relatives but simply gives relatives a differential advantage, depending on how close they are to him, we have a bias system that will reduce rent seeking. However, it will not lead to outcomes in any way superior. Similarly, the restrictions placed on campaign contributions and other methods of attempting to influence government policy are biased in the sense that they are heavier burdens for some people than for others, and it is not clear whether this bias will lead to policy choices superior to those obtained without it. Thus, the only gain is the possibility of reduction in total rent seeking.

Thus ends our preliminary investigation of rent seeking and ways to reduce its social cost. When I have discussed the problem with colleagues, I have found that the intellectually fascinating problem of zones II and III tends to dominate the discussion. This is, indeed, intellectually very interesting, but the real problem we face is the attempt to lower the cost of rent seeking, and this will normally move us into zone I. Thus, I hope that the result of this paper is not mathematical examination of the admittedly fascinating intellectual problems of zones II and III, but practical investigation of methods to lower the cost of rent seeking.

APPENDIX TO CHAPTER 6

Mathematical Appendix, or Labor Saving Calculation Methods

When I first began working on this paper, I discovered that the equations that would have to be solved were higher-order equations, and therefore simply assigned to my graduate assistant, William J. Hunter, the job of approximating the results by using a pocket calculator. He promptly discovered the rather astonishing regularity of column 1, which implied that it would not be all that difficult to solve the equations even if they were higher order. Before I had had time to do anything other than shudder vaguely about the problem, however, I went to lunch with my colleague, Nicolaus Tideman, told him the problem, and he solved it on a napkin. This gave us the equation for tables 6.1 and 6.2. Having discovered this simple algorithm, when we wanted to prepare tables 6.3 and 6.4, once again we asked Tideman, and he obliged with equal speed. The equations used are:

$$P_A = R\frac{N-1}{N^2} \qquad \text{(Tables 6.1, 6.2)}$$

$$P_A = R\frac{b}{(b+1)^2} \qquad \text{(Tables 6.3, 6.4)}$$

where

P_A = equilibrium investment,
R = exponent, or the determinant of steepness of the supply curve,
N = number of players, and
b = bias weight.