Reducing Rent Seeking by Providing Wide Public Service*

Amihai Glazer
Department of Economics, University of California, Irvine
Irvine, California 92697
USA

Stef Proost
Center for Economics Studies, Katholieke Universiteit Leuven
Naamsestraat 69
B-3000 Leuven
Belgium

November 10, 2010

Abstract

A winning coalition which sets policy cannot always ensure that members of the coalition will be the ones getting benefits. Different jurisdictions (including members of the winning coalition) may then engage in costly rent seeking. Maximizing the welfare of the winning coalition may therefore require providing services to jurisdictions which are not members of the winning coalition, thereby reducing rent seeking by members of the winning coalition. The paper shows how this mechanism can generate insufficient supply of public services, and offers another explanation for the use of co-funding requirements by the central government.

*We thank participants at the workshop on Political Economy of Transportation (Valencia 2010) for their comments, and FWO-Flanders for financial support.

1 Introduction

A standard story of politics has a majority provide services to its members, offering little to members of the minority. Yet we often observe that government provides some services to almost everyone. An early example is the penny post, introduced in Britain in 1840, which charged a uniform penny for carriage and delivery of mail between any two places in the United Kingdom of Great Britain and Ireland, regardless of distance. For another example, consider bus services in Flanders, Belgium. By law, all citizens have the right to be served by a bus stop at a maximum of 0.5 km from their homes. As bus service is provided by a government company, government subsidizes this service. Other regions in the European Union have similar policies. In some, the monopoly supplier must offer a specified frequency, financed by cross subsidies from other regions or other customers; provision of telecommunications in rural areas is one example. Singapore imposes a similar obligation: "To protect commuters, the PTC [Public Transport Council] ...imposes the Universal Service Obligation (USO) upon bus companies; requiring them to provide a comprehensive network of scheduled bus services to within 400 meter radius of any development with a specified minimum level of daily passenger demand. Such scheduled bus services run on predetermined routes and cannot charge fares higher than the fares approved in accordance with the fare review mechanism" (http://www.ptc.gov.sg/services.asp).

Of course, some private firms also offer universal service. Think of FedEx and UPS for delivery of packages, and cell phone providers in Europe. But here we shall concentrate on the public sector, offering one explanation for why voters or elected officials may favor universal service, even when it violates a standard cost-benefit analysis.

We argue that when the winning coalition cannot or does not fully specify who will win valuable services from a central government, different jurisdictions will engage in costly rent-seeking activities to win the service. The level of rent seeking declines with the number of jurisdictions that will be offered service. Universal service, or wide service more generally, can benefit the majority coalition by reducing the amount members of the coalition spend on rent seeking. Though our paper does not predict universal universalism, it does show conditions under which universalism can occur, and more generally shows that limiting service to members of the winning coalition is a special case. The paper shows how this mechanism can give rise to suboptimal supply of public services, and also offers another explanation for the use

of co-funding requirements by the federal government.

2 Literature

2.1 Universalism

The literature examines two extreme forms of winning coalitions. One approach, introduced by Riker (1962), predicts the existence of minimum winning coalitions—why should the agenda setter, or for that matter any member of the majority, offer anything to the minority. The other extreme examines conditions under which policies will win the support of very large majorities, with benefits going to almost all legislators. Weingast (1979), Shepsle and Weingast (1981), and Grofman (1984) show that legislators operating under a "veil of ignorance" (they do not know which coalitions will form in the future) will adopt a norm of universalism that calls for all legislators to benefit from pork barrel projects. From this perspective, universalism amounts to an insurance policy for risk-averse legislators (Shepsle and Weingast 1981). Costs of drafting policy can affect the policies a legislator proposes, by inducing him to introduce policies a large majority of legislators support (Glazer and McMillan 1992), or by proposing policies which other legislators would later not want to amend (Glazer and McMillan 1990).

An economic, rather than political, explanation for wide service relies on network externalities. Network effects arise when consumption by one consumer increases the benefits obtained by other consumers. For example, the greater the number of people who own a phone, the easier it is for a user to contact other people. Or, the more people use Android phones, the easier it is for any user to get advice from other users on how to use the device. For governmentally provided goods, network externalities can appear for additional reasons. Universal postal service may bond the country (New York *Times*, August 9, 2009). Adverse selection, as in insurance markets, may make it difficult to limit coverage.

In one sense, we too have a network effect—the greater the number of jurisdictions given service, the greater the net benefit to each. But our network effect arises from the benefits that arise when districts compete less intensely to obtain the service, rather than from more districts getting service.

2.2 Incomplete targeting of benefits

Much literature supposes that the winning coalition in a legislature can fully specify policy, stating for example, which city will get what allocation for mass transit. But such specificity is often absent. Consider the United States. Porter and Walsh (2006) cite estimates of earmarked spending; one estimate is of $47.4 billion in 2005, and another estimate is of only $27.3 billion in 2005. The non-partisan Annenberg Political Fact Check (2007) reports pork-barrel spending, where legislation specifies spending in a legislator's jurisdiction, at about only one percent of federal spending.

Consistent with these data, McCubbins, Noll, and Weingast (1987 and 1989) suppose that the winning coalition's ability to set policy is limited. Instead, the winning coalition may adopt institutional rules that affect an agency's future decisions. One reason a legislator may prefer not to specify policy is that he is unsure about which location or which exact project would generate the most benefits to him. An additional uncertainty at the time the legislation is adopted is which special interest, or which group within the legislator's jurisdiction, the legislator would want to benefit. Or, though the legislators may want to specify policies, agency officials may not follow, or they may misinterpret, legislative directives. A cost of reducing agency discretion is that a small error in drafting legislation (say mis-spelling the name of a city) may mean that a member of the winning coalition will get no service at all; delegation to an agency allows for correcting such errors. Or the definitions of geographical areas or of beneficiaries may change, so that it is difficult to specify recipients. For example, a congressman who anticipates redistricting may not know which geographic area he will represent, and so cannot specify the recipient. Moreover, specifying by law individualized benefits is often considered as violating constitutional provisions. Once everyone understands that everybody else will restrict himself from proposing individualized benefits, it becomes rational for each individual to stay in this restrictive set of strategies, making this type of institutional behavior enforced (Myerson 2009).

2.3 Rent seeking

Rent seeking is often used in analyses of politics (Tullock 1967; Krueger 1974; Posner 1975; Bhagwati 1982; Buchanan, Tollison, and Tullock 1980; Tollison 1982). Most of the literature discusses rent seeking that benefits

firms or special interest groups. But the concept also applies to transfers of wealth to politicians or to their constituents: a politician, for instance, may lobby for federal funds to his district. Economists consider the problem a serious one. Tullock (1967, 1980) shows that in competitive rent seeking the aggregate resources devoted to pursuing redistributions of wealth can equal the value of the rents to be distributed. In a pioneering paper Krueger (1974) estimates the costs of rent seeking associated with trade restrictions at 15% of GNP in Turkey in 1968 and 7.3% in India in 1964. In a direct calculation of spending by firms entering a lottery for cellular telephone licenses, Hazlett and Michaels (1993) find that firms spend about a third of the value of the licenses on rent seeking.

Buchanan (1980) and others argue that constitutional restrictions on spending and taxes are necessary to reduce the resources consumed in seeking transfers of wealth. We will argue that universal service can limit rent-seeking efforts.[1]

We make use of the results about contest theory given by Clark and Riis (1998). But we differ in several ways from them and from others studying rent seeking. First, we look at the welfare not of the contest organizer or of the rent-seekers, but at the welfare of a subset—a majority of legislators or the pivotal member of a winning coalition, all of whom will seek rents, with additional people also seeking rents. Second, we focus not on aggregate rent seeking, but on welfare, defined as the values of the prizes won by members of the group, minus the tax paid to finance the service, minus their rent-seeking efforts. Third, we have the contest designed not by some exogenous holder of the prize, but by some of the potential rent seekers themselves. Last, we apply rent-seeking to a question not previously addressed in that literature—the behavior of a winning coalition under majority voting.

[1]Sometimes, in contrast to the problem we address, government wishes to encourage an activity, by offering a prize that induces rent-seeking activity. Patents grants are one example. Another example is the "Race to the Top" program of the Obama Administration which offered extra educational funding to states which offered the best promise of improving education.

3 Assumptions

3.1 Districts

Consider a country with an even number, N, of districts, each with one representative in the legislature. Policy is made by majority vote, so that at least $(N/2)+1$ of the districts must benefit from any policy proposal. A policy consists of providing a service (say bus service) to s districts; the policy decision is thus the value of s. A district's benefit from service is independent of the supply of the service to other districts. The cost of serving a district is identical for all districts, but the benefits differ by district. The aggregate cost of providing service to s districts is $C(s)$.

Districts are ordered from highest (index 1) to lowest (index N) value of gross benefits. As the cost of serving any district is identical, we assume that the winning majority coalition consists of the $(N/2)+1$ districts with the highest valuation. The cost of the services is shared across all N districts; the tax paid by the pivotal district in the winning coalition is $fC(s)$, with $0 < f \leq 1$. For example, f could be $1/N$ when the costs are shared equally over all districts. Each district pays the tax whether it receives the service or not.

The value of service to district i is $v_i (i = 1, 2, ..., N)$, with $v_1 \geq v_2 \geq ...v_N$. More generally, we can think that the majority can structure the policy so that a district which is a member of the majority coalition gets at least as great a benefit from the service as does a district which is not a member of the majority coalition, that is $v_i > v_j$ if $i \leq (N/2)+1$ and $j > (N/2)+1$. Each district can get the service or not; it does not get multiple service. The benefit v_i is independent of when a district receives service and of how many districts receive service. The valuations are common knowledge.

For some explicit results we will make more specific assumptions. The cost of providing service to s jurisdictions is then $F + cs$; the ith highest valuation is then $v_i = a - bi$, with a and b positive parameters.

3.2 Rent seeking

We assume that though the majority sets the total budget (or sets the number of districts to be served, s), an agency selects the districts to be served. Each district can lobby the agency.

Consider a multi-prize contest, where s identical prizes are distributed to

$s \leq N$ districts. Our analysis applies to different kinds of lobbying scenarios. A simple mechanism, the English auction, would have each district make a bid. The agency provides service to the s highest bidders; a district which gets service pays its bid and pays the taxes which finance aggregate spending; a district which gets no service pays only the taxes.

A different formulation, which yields almost identical results, builds on Clark and Riis (1998). Let each of the N districts simultaneously choose an outlay (rent-seeking effort that is a sunk cost) $x_i \geq 0$. One of the participating districts gets the first service offered. The remaining $N-1$ districts which had not yet received service then engage in a similar game, with each exerting rent-seeking effort; again one district is selected. The game repeats until s districts receive service. The discount factor is 1, so that a district does not care when it gets the service. We note that our results continue to hold in a simultaneous game in which each district engages in rent seeking only once, with the s districts that spent the most obtaining service.

The majority coalition chooses s to maximize the net benefit (probability of obtaining the service times the value of the service, minus rent-seeking efforts, minus taxes to finance service) of its pivotal member. We shall suppose that the pivotal member is the median one, with valuation $v_{N/2+1}$. But that is not critical to our results.

The timeline follows.

1. Nature assigns a valuation v_i to each district
2. The winning coalition chooses the number, s, of districts that will get service
3. The winning coalition chooses the number, s, of districts that will get service
4. Each district pays the share of taxes that will finance the services to s districts
5. Each district engages in rent seeking (repeatedly if it had not obtained service in the previous round) to get service
6. The agency assigns service to s particular districts
7. A district i which gets service enjoys a gross benefit v_i

4 Results

4.1 Equilibrium benefits

Consider first lobbying as described by an English auction. Let N players with valuations $v_1 \geq v_2 \geq ...v_N$ compete for s identical prizes. The equilibrium is for districts $1...s$ to each bid v_{s+1}, for district $s+1$ to bid an infinitesimal amount below v_{s+1}, and for districts $s+2...N$ to each bid 0. Each of districts $1...s$ gets the service, paying v_{s+1}, and so district i's net benefit is $v_i - v_{s+1} - fC(s)$. Districts $s+1...N$ do not get service, but pay taxes for the services others receive. This set of bids is a Nash equilibrium because no district can gain by changing its behavior. For example, if district $s+1$ bids v_{s+1} instead of $v_{s+1} - \epsilon$ it would have a chance of getting the service, but the benefit from the service would equal the bid it must pay for it. We shall make much use of the result that in equilibrium the net benefit of district i (for $i = 1...s$) is $v_i - v_{i+s} - fC(s)$.

Remarkably, though not previously noticed, the same net benefits apply for an all-pay auction. Clark and Riis (1998) show that in a contest with N players with valuations $v_1 \geq v_2 \geq ...v_N$ competing for s identical prizes by making (sunk) efforts, a unique equilibrium in mixed strategies exists. Only the $s+1$ districts with the highest benefits spend a positive amount on rent seeking. The expected net surplus of actively participating player $i = 1, 2, ...s+1$ is $v_i - v_{s+1} - fC(s)$. The expected net benefits of the pivotal member of the winning coalition, when s districts will receive service are:

$$v_{N/2+1} - v_{s+1} - fC(s). \tag{1}$$

For the following, we can rely on the results of Clark and Riis (1998), or we can view lobbying as a form of an English auction. That means that the pivotal member would want to extend service from s to $s+1$ districts if $fC(s+1) - fC(s) < v_{s+1} - v_{s+2}$.

Under the all-pay auction, the probability that district i wins the service at some round or other is (see result (13) in Clark and Riis 1998)

$$P_1 = 1 - (1/2)^s \frac{v_{s+1}}{v_1}, \tag{2}$$

and, for districts $2...N$

$$P_i = 1 - (1/2)^{s+2-i} \frac{v_{s+1}}{v_i}. \tag{3}$$

Note that in an all-pay auction a district that is a member of the winning coalition which votes for the policy is not sure to get the service. Thus, a difference between the results under an English auction and under an all-pay auction is that the equilibrium under an English auction is efficient—the districts that most highly value the service always get the service. In contrast, under the all-pay auction, with positive probability a district with valuation greater than v_{s+1} may not get served, whereas the district with valuation v_{s+1} does get served.

Under the all-pay auction, an increase in s yields two benefits to each district in the winning coalition: it increases the probability that the district receives service, and it reduces the equilibrium level of rent-seeking effort. Under the English auction, only the second benefit appears. Note that if $s = N$, there is no rent seeking, each district obtains service, and the net benefit to district i is $v_i - fC(N)$.

For values of $s < N$, it is critical to note that a district's net expected benefit depends not on gross benefit v_i, but on the difference between its gross benefit and that of the marginal rent-seeker. If $v_{s+1} = v_{s+2}$, for all s, and if $s < N$,then a majority district gains nothing from an increase in s.

PROPOSITION 1 The service is never supplied to fewer than $N/2 + 1$ districts.

PROOF: Of course, to get majority support, service must be provided to no less than a majority of the districts, or $s \geq N/2 + 1$. For example, if s prizes are provided, only the $s + 1$ players with the highest valuation seek service, with the player indexed by $s+1$ enjoying zero expected benefit from engaging in rent seeking. Thus, if $s < N/2 + 1$, the pivotal district, indexed by $N/2 + 1$ gains zero expected benefit from rent seeking, but must pay a share of aggregate costs. Thus, a proposal with $s < N/2 + 1$ cannot gain majority support. .

PROPOSITION 2 The majority sets the number of districts that will get service as

$s = N$ if $v_{N/2+1} - fC(N) > 0$ and $v_{N/2+1} - fC(N) > v_{N/2+1} - v_{s+1} - fC(s)$ for all $N/2 + 1 \leq s \leq N - 2$

$N/2 + 1 \leq s < N$ if $v_{N/2+1} - v_{s+1} - fC(s) > 0$ and $v_{N/2+1} - v_{s+1} - fC(s) > v_{N/2+1} - v_j - fC(j)$ for all $j > s$

$s = 0$ otherwise.

PROOF. The proof immediately follows from the observation that the pivotal district's gross benefit when $s < N$ is given by (1). The pivotal district's benefit when $s = N$ is $v_{N/2+1} - fC(N)$.

So for an interior solution, the number of districts s that are served satisfies the condition that the marginal cost to a majority member of serving one more district equals the difference in net benefits for the next district in line. And the majority may adopt universal service because then no district spends anything on rent seeking.

The smaller the benefit for the lower-valuing districts (districts with index greater than $N/2+1$), the higher the pivotal voter's benefit. First, the lower-valuing districts will spend less on rent seeking so the pivotal district gains a larger expected surplus $v_{N/2+1} - v_{s+1}$. Second, for some of the N districts v_i may be non-positive; they will not seek the service and so reduce the tax cost for the pivotal district.

The observation that the net benefit of the pivotal district equals the difference between its valuation of the service and the valuation by district $s + 1$ has several implications.

Majority may favor universal service The majority may favor universal service, to eliminate the need for rent-seeking efforts. Limited service is sub-optimal for the pivotal district if $v_{N/2+1} - v_s - fC(s) < v_{N/2+1} - fC(N)$ for all s greater than $N/2 + 1$ and less than N, or if $(C(N) - C(s))f < v_s$ in this range of s. A sufficient condition for universal service is that all v_i are equal (so that non-universal service would exhaust benefits because of rent seeking) and that $fC(N) < v_{N/2+1}$ so that the benefit of service to the pivotal district exceeds its share of the costs of universal service.

Universal service is more attractive the more homogeneous the districts The results imply that the benefit of universal service increases with the homogeneity of the districts, where homogeneity is measured by the difference between $v_{N/2+1}$ and the valuations of districts with indices higher than that. So more homogeneous societies may more frequently give universal service not because of altruism, but to avoid rent seeking.

Majority favors low quality of service We so far took the quality of the service as exogenous. Rent seeking can generate an incentive for low quality of service. To see this, let the winning coalition decide not only on how many districts are served, but also on the quality of the service. Suppose first that the gross benefit function is positive for all N districts, and remains positive whatever the quality selected. Then if the majority can reduce the valuation for all districts with index greater than $N/2 + 1$, the expected benefit for the pivotal district increases under non-universal service. By reducing the valuation of these districts, the rent-seeking efforts of these districts will decline, thereby reducing the rent-seeking efforts of the pivotal district.

In particular, consider a costless deterioration of quality which reduces everyone's valuation by the constant k. We can represent this change with a parallel shift of the v function. Such a shift does not change $v_i - v_{s+1}$, and so does not harm the pivotal district. So even for the slightest cost saving, the pivotal district will favor a decline in quality.[2]

Majority favors cost sharing In many countries, the higher-level government (federal, or state) finances only some of the cost of service, requiring a district which receives service to bear a share of the cost. We shall see that members of the majority may favor a policy which imposes cost sharing on districts which receive service. We examine only the case where the federal level can require a district that gets service to pay a fraction k (with $k < c$) of the cost, in addition to paying its share of costs incurred in providing service to other districts.

A value of $k > 0$ is equivalent to a reduction in quality, or to a reduction of each v_i by the amount k. Ignoring for the moment the tax a district pays, such a uniform reduction in v_i leaves $v_i - v_{s+1}$ unchanged, and therefore does not affect the expected gain of district i. But, in addition, a positive value of k reduces the tax each district must pay the central government, and so a positive value of k can generate higher benefit to a member of the majority coalition than does a zero value of k. [3]

[2]Matters differ if different districts place different values on quality. Then, ignoring costs of providing service, the pivotal member of the winning coalition would like a quality that maximizes the difference between his valuation of the service and the valuation by district $s + 1$. If the pivotal member values quality more than do districts not members of the winning coalition, then the pivotal member may favor an increase in quality.

[3]As with the analysis of quality, matters differ if the cost of raising revenue necessary to finance cost-sharing differs across districts. If, for example, raising revenue imposes a

This explanation for cost-sharing complements a common view that local officials are better informed than are central government officials about local conditions, so that cost-sharing induces the adoption of a project in those districts that are most likely to benefit from it (Oates 1972). A centralized and uniform supply of services is more efficient when preferences are homogeneous. Under our analysis, homogeneity of preferences will induce universal supply but for a different reason—it avoids large spending on rent seeking.[4]

Majority may prefer service to more districts than does the minority We have seen that the benefit to the majority of extending service to multiple districts lies in part in the reduction in rent seeking. The benefit to the majority need not, however, extend to all members of the minority. Suppose some member of the minority (say district 10) values the service at v_{10}, which is close to zero, and that district 9 values the service at v_9 which is reasonably larger than the cost to a district of expanding service, c/N. Then if the majority expands service from district 9 to district 10, the expected net benefit to a member of the majority increases by approximately $v_9 - c/N > 0$. But district 10 gets no net benefit in equilibrium, while paying added taxes of c/N. That is, district 10 would prefer that it would never get service, rather than that enough districts get service so that it also has a chance to obtain it. Service is extended over the objections of a district that might get it.

Allocation is inefficient How does behavior under rent seeking compare to the first-best allocation of services to the different districts? There are four sources of inefficiency. First the chosen level of s is always inefficient when the optimal $s^* < N/2 + 1$, as shown in Proposition 1. Without further functional specification we can not claim that the number of districts served, s, is always too high.

A second source of inefficiency lies with the identity of the districts that are served. For any s that is selected, it is always efficient to choose those districts with the highest benefits. Under rent seeking with an all-pay auction, such an allocation is not guaranteed as, in equilibrium, $s + 1$ districts

larger social cost in districts which belong to the minimum winning coalition, then that coalition would oppose cost sharing.

[4]Cheikbossian (2008) sees a benefit of decentralization in reducing rent-seeking activities across regions: under centralization, each region wishes to push the central government for greater spending in its region, and lower spending in the other region.

compete for s prizes so those with the highest benefits are not necessarily selected.

The third source of inefficiency is obviously the rent seeking itself. It is an unproductive sunk cost, which can be particularly large when the districts are homogeneous. A fourth source of inefficiency lies in the incentive for too low quality.

Taxing the supply to the minority Consider a pivotal district which who places little value on the service, and so would prefer that the service not be provided at all. This can leave a high-valuing minority with high welfare losses. An extreme solution to this problem is private provision organised by the minority. Another solution is to offer public services to $s < N/2 + 1$ districts, but with each paying an amount exceeding the cost. The pivotal district would then want to maximize total revenue minus total costs, and would want to avoid the districts from engaging in rent seeking—such rent seeking would reduce the willingness to pay by the districts that value the service, and so would reduce revenue. The number of districts that will be served will, however, be less than the welfare-maximizing number, as the pivotal district votes for the the tax-revenue maximising solution so that at this s, the value to the district is larger than the marginal cost.

4.2 Risk aversion

Some of our results will appear if rent seeking is absent but voters are risk averse. Under the all-pay auction but not under the English auction, a district in the majority may then fear that it will not get the service, and so it prefers a large s.

The risk-aversion hypothesis, however, looks at v_i, rather than at $v_i - v_{s+1}$, and therefore does not make our predictions about inefficient policies. In particular, if the v_i's are all equal, then an increase in s generates no benefit to any player, unless service is universal. That differs from risk aversion.

When the rent-seeking effects we consider are important, a study which interprets behavior as resulting from risk aversion may overestimate the degree of risk aversion. For the aim of reducing rent seeking will call for extending service beyond what risk aversion would call for.

5 Linear functions

To illustrate the results, consider linear functions, $C(s) = F + cs$, with c and F positive constants, and $v_i = a - bi$. To allow for the possibility of universal service, suppose that $v_N = a - bN = 0$. We let the cost of service be divided equally across all districts, so that the pivotal district's tax is $(F + cs)/N$. We have the following rather strong specific results.

PROPOSITION 3 Consider a linearly declining benefit function and a linear cost function. Then

- a. The pivotal district favors either service to all districts, or no service at all.
- b. The pivotal district favors universal service if the average cost of the service is larger than its benefit.
- c. If quality can be set to reduce benefits and save costs by a fixed proportion of the cost per district, and if $v_N = 0$, then the quality supplied will always be biased downwards by 50%.
- d.If $v_N = 0$, the average cost of the service is lower than its value to the pivotal district, and co-funding can be required, then the pivotal district always favors a co-funding of 50%.
- e. If the average cost of the service is higher than the value of the service to the pivotal district, and if the majority can require co-funding, then the pivotal district always favors a co-funding of more than 100%, there is no rent seeking, and only half of the socially optimal number of districts is served.
- f. Adding the option of co-funding never reduces welfare.

PROOF: Parts a and b: If the pivotal district prefers less than universal service, it will select s to maximize $[a-b(N/2+1)]-[a-b(s+1)]-cs/N-F/n$. But this maximization entails a corner solution. If $b > c$ the pivotal district may favor universal service; if $b < c$ the pivotal district prefers no service at all. If $b > c$ and if $a - b(N/2 + 1) > c + F/N$, or the benefit from service exceeds average cost, it will favor universal service.

Part c: The proof follows from simple optimization of the quality decrease and decrease in unit cost (r) such that the net benefit to the pivotal district is maximized, given that (from part (a)) that the pivotal voter favors universal service to all districts that value it. We look for the maximum of $(a - (b)(N/2 + 1) - r) - (c - r)n(r)/N$ where $n(\cdot)$ is the number of districts for which $v_i - r \geq 0$. Solving $a - bn - r = 0$ yields $n(r) = (a - r)/b$, and so $r = c/2$

Part d: shown in part c as r can be seen as a monetary contribution to the central government, the result is a co-funding requirement of 50%.

Part e: Assume that the pivotal district can require a co-funding of $r > c$ and that it does not benefit from having the service supplied to itself. If the number of districts with $v_i > 0$ is less than $N/2 + 1$ (that is, if only a minority of districts would benefit from obtaining the service), then the goal of the majority differs from what we discussed above. Any majority that forms would have as a member a district that does not value the service. Under the assumption that any revenue raised is distributed equally among all districts, the pivotal district would then want to maximize the net revenue raised from providing the service. That is, the pivotal district could be viewed as a monopolist providing a service at marginal cost c, and charging a price r for it. Notice, that any price r will determine a number of districts, $n(r)$ that want the service at price r. The pivotal district would then want to set $s = n(r)$, and so no district would engage in rent seeking. In this case, the pivotal district chooses r that maximizes total net tax revenues and this generates the monopoly solution where only half of the optimal number of districts get service.

Part f: Assume first that only a minority values the service. If co-funding at more than 100% is infeasible, the pivotal district will never favor government providing the service. With co-funding at more than 100% feasible, the minority districts can decide for themselves to opt for the service or not, and so their welfare can never decrease. Assume next that the pivotal district benefits from universal service when it can not impose co-funding. With our assumptions there is always universal service and so oversupply in the absence of a co-funding requirement. Any co-funding rate between 0 and 100% will reduce the number of districts served, and will increase welfare as the districts that are no longer served valued the service at less than the marginal cost.

Regarding the welfare consequences of the choice of s, it is not necessarily

true that if the majority chooses to supply the service to $N > s > N/2 + 1$ districts, it will always be supplied to excessively many districts. The problem is that the pivotal district may decide not to offer the service because he compares his benefit with his share of taxes to finance universal service, whereas the social efficiency criterion takes the total surplus of high value districts into account.

Figure 1 depicts the results, assuming that the fixed cost is zero and that the socially-optimal solution calls for providing the service to s^o districts (with $N/2 + 1 < s^o < N$). At this optimum, the marginal cost of extending the service, c, equals the benefit, $v(s)$, to the last district served. How does this condition compare with our equilibrium? Note first that it is never optimal for the pivotal district to set $s = N/2+1$, because the contest would result in the pivotal district obtaining a gross benefit $(b)(N/2+1) - (b)(s+1) = b$; the pivotal district does better under universal service which would give it the benefit $a - bN/2 - c$. If c is uniformly distributed, so will be s^o, and in this case the costs of underprovision (when $s^o < N/2 + 1$, the service is never offered) are much larger than the costs of overprovision.

Figure 2 illustrates the effects of reduced quality. Consider a downward shift in the benefit function, with a concomitant reduction in the tax required to finance service. As it is the benefit function that will determine how many districts seek service and starting from the initial position where $r = 0$ and $a - bN = 0$, reducing quality reduces the number of districts that want to be served; remember that in our linear model all districts that want the service will receive the service as the pivotal voter wants to avoid rent seeking. But when the benefit of service is 0 for the last district, a reduction in quality reduces the costs of serving all the districts for whom v_i remains positive by more than the reduction in v_i for the pivotal district.

Figure 2 can illustrate the effects of a requirement for co-funding. If $s^o > N/2 + 1$, a co-funding requirement of r reduces the net benefit of the service to the pivotal district, reduces the number of districts served when service is offered to all that want it, and reduces the tax paid by the pivotal district. Increasing the co-funding requirement r beyond c does not benefit the pivotal district because the pivotal district misses the opportunity to spread the costs of service over N districts via the general tax system.

6 Conclusion

In designing a policy, the legislators who control the policy should care not only about the costs of the policy, or about the benefits that a service would yield to those districts which get service. When control over policy is imperfect, members of the minimum winning coalition should be concerned about rent-seeking activity by all districts. That means that members of the winning coalition should worry about the benefits to districts excluded from the winning coalition. The general principle is that the members of the winning coalition benefit from reducing the benefits to the marginal district that seeks service. Such reductions can take several forms. One is to provide service to many districts—the greater the number of districts that would get service, the smaller the benefit to the marginal district that might get service, and consequently the larger the expected benefits to the infra-marginal district. We also saw that similar effects can arise if the quality of the service is reduced, or if districts which get service must pay a share of the costs. To put it differently, the expected benefit a district obtains when districts compete for service depends not on the absolute benefit from the service, but on the comparative advantage a district enjoys, or on the difference between its benefits and what other districts get.

References

[1] Annenberg Political Fact Check (2007) "What percentage of the national spending is pork?"

[2] Bhagwati, Jagdish N. (1982) "Directly unproductive, profit seeking (DUP) activities." *Journal of Political Economy*, 90: 988-1002.

[3] Cheikbossian, Guillaume (2008) "Rent-seeking, spillovers and the benefits of decentralization." *Journal of Urban Economics*, 63(1): 217-228.

[4] Clark, Derek J. and Christian Riis (1998) "Competition over more than one prize." *American Economic Review*, 88(1): 276-289.

[5] Glazer, Amihai and Henry McMillan (1990) "Optimal coalition size when making proposals is costly." *Social Choice and Welfare*, 7(4): 369-380.

[6] Glazer, Amihai and Henry McMillan (1992) "Amend the old or address the new: Broad-based legislation when proposing policies is costly." *Public Choice*, 74: 43-58.

[7] Grofman, Bernard (1984) "The general irrelevance of the zero sum assumption in the legislative context." In Manfred Holler, ed. *Coalitions and Collective Action*. Physica-Verlag, Wfirzburg, pp. 1200-1212.

[8] Hazlett, Thomas W. and Robert J. Michaels (1993) "The cost of rent-seeking: evidence from cellular telephone license lotteries." *Southern Economic Journal*, 59(3): 425-435.

[9] Krueger, Anne O. (1974) "The political economy of the rent seeking society." *American Economic Review*, 64(3): 291-303.

[10] McCubbins, Mathew D., Roger G. Noll, and Barry R. Weingast (1987) "Administrative procedures as instruments of political control." *Journal of Law, Economics and Organization* 3(2): 243-277.

[11] McCubbins, Mathew D., Roger G. Noll, and Barry R. Weingast (1989) "Structure and process, politics and policy: Administrative arrangements and the political control of agencies." *Virginia Law Review*, 75(2): 431-482.

[12] Myerson, Roger (2009) "Learning from Schelling's strategy of conflict." *Journal of Economic Literature*, 47(4): 1109-1125.

[13] Porter, Rob and Sam Walsh (2006) "Earmarks in the federal budget process." Harvard Law School, Federal Budget Policy Seminar, Briefing Paper 16.

[14] Posner, Richard A. (1975) "The social costs of monopoly and regulation." *Journal of Political Economy*, 83(4): 807-827

[15] Riker, William (1962) *The Theory of Political Coalitions*. New Haven: Yale University Press.

[16] Shepsle, Kenneth and Barry Weingast (1981) "Political preferences for the pork barrel: A generalization." *American Journal of Political Science*, 25(1): 96-111.

[17] Tollison, Robert D. (1982) "Rent seeking, a survey." *Kyklos*, 35(4): 575-602.

[18] Tullock, Gordon (1967) "The welfare cost of tariffs, monopolies, and theft." *Western Economic Journal*, 5: 224-232.

[19] Tullock, Gordon (1980) "Efficient rent seeking." In: J. M. Buchanan, R. Tollison, and G. Tullock eds., *Towards a theory of the rent seeking society* (College Station, Texas A & M University Press).

[20] Weingast, Barry (1979) "A rational choice perspective on congressional norms." *American Journal of Political Science*, 23(2): 245-62.

7 Notation

$C(s)$ Cost of providing service to s districts

f Fraction of total service costs incurred by any one district in the majority coalition

N Total number of districts

P_i Probability that district i obtains service

s Number of districts that obtain service

v_i Valuation of service by district i

FIGURE 1 Benefits for median voter for broader levels of supply

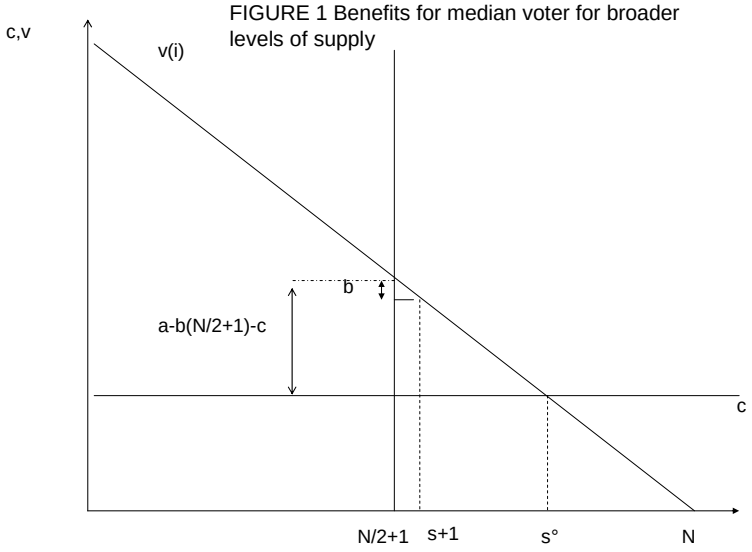

FIGURE 2 Effects of quality decrease or cofunding