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No. 3585

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PUBLIC POLICY

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Available online at: **www.cepr.org/pubs/dps/DP3585.asp**

ISSN 0265-8003

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Discussion Paper No. 3585
October 2002

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CEPR Discussion Paper No. 3585

October 2002

ABSTRACT

Government and Cities: Contests and the Decentralization of Decision Making*

Governments do not have perfect information regarding the priorities and the needs of different groups in the economy. This lack of knowledge opens the door for different groups to lobby the government in order to receive the government's support. We set up a model of hierarchical contests and compare the implications of a centralized allocation process with a decentralized allocation process. We show the potential existence of a poverty trap as a result of fiscal federalism.

JEL Classification: D72, H73 and H77
Keywords: contests, economic models of political processes, fiscal federalism, intergovernmental relations and interjurisdictional differentials and their effects

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*An earlier version of this Paper was presented at the CEPR/DIW Conference Social Policies and the Cities, Berlin. Part of the work on this Paper was completed when both authors were visiting IZA, Bonn. We thank them for their courtesy.

Submitted 03 September 2002

1. Introduction

Intergovernmental grants arise in a number of hierarchical scenarios. Many countries have a federal governmental structure consisting of a central authority and various sub-central jurisdictions. Within these sub-central jurisdictions there are other jurisdictions; and within these, often, still other jurisdictions. Normally, but not always, we think of the grants moving from the higher to the lower levels of government. At the supranational level, bodies such as the European Union dispense funds to member countries. International organizations, such as the World Bank provide grants and loans to sovereign entities. Indeed, intergovernmental grants occur between countries, as in foreign aid from one country to another.

There is a large literature on intergovernmental grants. Some of the literature on this and other aspects of fiscal federalism are nicely reviewed in Gramlich (1977) and Oates (1999). On recent trends in fiscal decentralization, see Tanzi (2001). Among the topics in the intergovernmental grants literature are revenue sharing (Fisher 1979; Nitzan, 1977; Zhuravskaya, 2000), fiscal equalization across subnational jurisdictions (Boadway and Flatters, 1982; Goodspeed, 2000), fungibility and flypaper effects (Zampelli, 1986; Hines and Thaler, 1995), foreign aid (Cashel-Cordo and Craig, 1990; Gang and Khan, 1991; Heller, 1975; Pack and Pack; 1993; Swaroop, Jha and Rajkumar, 2000), and taxation (Goodspeed, 1995). Most of this literature, in one way or another, has looked at the impact of the grants.

Our approach is somewhat different. We start from the presumption that the central authority does not possess all of the information necessary to make proper allocations of its funds. The central authority needs information inputs. This opens the door for attempts to influence the central authority via rent-seeking activities. We ask the question: Is it better or not to have a federal structure with an intermediate level of government between the central authority and the local institutions? Thus, rather than examining the impact of intergovernmental grants, we are interested in the competition for grants and the structure of the federalism.

To answer our question we set up a model of hierarchical rent-seeking and compare the implications of a centralized allocation process with a decentralized allocation process. In an attempt to increase efficiency the central government may choose to allocate rents directly to constituent groups or it may choose to decentralize decision-making by allocating the rents to, for example, different cities. The cities, in turn, will allocate rents to the different groups within its district.

We analyze this decentralization of decision-making in a theoretical rent-seeking framework. In essence, we are comparing the outcome of a one-stage game (the central authority makes its grants directly to competing groups) to the outcome of a two-stage game (the central authority makes its grants to competing intermediate authorities which make grants to competing groups) (see Baik and Lee, 2000). We take into account the knowledge that the government has regarding the needs of the different groups and the information the city has regarding these groups. We also provide some insight into the question of how decentralization increases or decreases total rent-seeking activity, and how the level of information possessed by the government and the cities affects rent-seeking activity and the probability of receiving transfers.

Hierarchical rent-seeking, as is present in our model, is also present in Hillman and Katz (1987). They evaluate the social losses due to resources used to contest a bribe that is transferred up a hierarchy. In the Hillman-Katz model, the rent enters the hierarchy exogenously. In our model the value of the expected rent is endogenous, reflecting the incentives to divide time between rent-seeking and productive activity.

In the rent-seeking literature it has been established that asymmetry between the contestants reduces wasteful lobbying efforts. The asymmetry can be in terms of the lobbying capabilities, wealth endowments, attitudes toward risk or rent valuations of the contestants, as in, for example, Allard (1988), Gradstein (1994), Nitzan (1994), and Nti (1999). In a similar way, in our model asymmetry affects lobbying efforts and thus the probability receiving a share of the rent.

Our model is of general interest for all intergovernmental structures. We concentrate in this paper on a central government (the federal government in the United States, or perhaps one of the State's governments), cities inside that central governments authority, and groups or institutes within the cities. The government is partially interested in allocating funds to the most needy. Its problem is that it does not generally know who the needy are: in which cities do they live and who they are among the groups within a city. With this in mind, in the next section we establish and analyze a model of hierarchical rent-seeking. In this context we show the potential existence of a poverty trap as a result of fiscal federalism.

2. The Model and Analysis

Overview

Our model has the following characteristics. There are three layers in the hierarchy. For example, the top layer is typically the central government, the intermediate level is typically the state government, and the lower level the cities, local governments, or, possibly, the people. Of course, there are many other hierarchical relations we could describe. Here we assume there is a central authority called the government. At the intermediate level there are two cities, city A and city B. Within each city there are institutes (or, the people) that request funds. The institutes may request funds from the cities or from the government. Lobbying is time consuming, decreasing the time spent on productive activities.

Denote by w_i the economic status of institute *i.* The economic status of an institute is used in this model for two reasons: first, it represents the economic needs of the institute -- the lower is w_i the more funds are needed by the institute -- and, second, it represents the cost of lobbying. The lower the economic status of the institute the lower the opportunity cost of lobbying. By reducing the time spent on productive activities, lobbying is costly in terms of lost income. w_i represents the cost of lobbying per unit of lobbying.

We first discuss the information structure. Then in our setting we consider two specific cases:

a. In the first period both cities lobby the central government for funds. In the second stage each institute lobbies its city to receive part of the funds the city received.
b. The institutes lobby the central government directly.

The role of the government and the information structure

We assume that the rents the central government has to distribute are fixed and exogenous. As in Epstein and Nitzan (2002a) central government politicians and bureaucrats are recipients of the lobbying efforts of cities and institutes. Lobbying efforts may be dollars directly paid to members of the central government, political and business connections, or other such relationships. Below we specify the role of the central government and its objective more formally.

We now consider the information the central government has regarding the objective needs of the different cities/institutes. One extreme case is that the government has no information regarding the needs of cities/institutes. In general, however, the government has partial knowledge of the cities/institutes needs.[1] The government's information level determines the contest-success function. In the first case the contest success function is independent of the needs of the institutes while in the second case, the contest-success function is positively related to a cities/institutes needs.

Consider a government that has to choose which city/institute to help. Neoclassical economic theory assumes that the government has utility that allows it to rank these alternatives. The government then chooses the highest ranked alternative. Psychologists (e.g. Luce (1959), Tversky (1969) and (1972)) criticize this deterministic approach, arguing that the outcome should be viewed as probabilistic process. Their approach is to view utility as deterministic but the choice process as probabilistic. The government does not necessarily choose the alternative that yields the highest utility; instead it has a probability of choosing each of the various possible alternatives. Along these lines, Luce (1959) proposes a model of "*bounded rationality*" (see also Sheshinski (2001)). Luce shows that when choice probabilities satisfy a certain axiom (the choice axiom), a scale, termed utility, can be defined over alternatives such that the choice probabilities can be derived from scales (utilities) of alternatives.

An alternative way of looking at this is that governments are limited in the information they have and during the lobbying effort become more knowledgeable regarding the needs of the cities/institutes. Alternatively, governments consist of people who are affected by lobbying effort for political and other reasons (see for example, Epstein and Nitzan (2002a, 2002b), Grossman and Helpman, (1994)).

[1] It may well be the case that the government has full information however creates a contest in order to receive transfers from the cities and institutes in order to increase its power.

The probability of a city or an institute winning part of the rents is therefore a function of the lobbying effort, the needs of the city/institute and the level of information the government has regarding these needs. This is captured in our contest success function. Below, in order to understand our general results we illustrate them by using a specific contest success function. General results will be presented as Claim X and a result based on the illustration will be presented as Claim XE.

Case A: Government, Cities and Institutions

A.1. Competition Between Cities

The government has R funds to allocate to the different institutes via the two cities, A and B. Denote by L_i the lobbying effort of city i attempting to extract rent from the government. Denote by $\Pr_i$ the proportion/probability city i receives out of the total funds (total rent) the government has to allocate. Therefore, the expected size of the rent that this city will obtain is $Pr_i\, R$. We can also think of this description as city i receiving $Pr_i\, R$ of the rent.

Each city invests resources in order to obtain the rent, exerting lobbying effort L_i. The cities are risk neutral. The objective of city i is to maximize its expected payoff which is given by:

(1) $$E(U_i) = (1 - L_i)v_i + \Pr_i R \quad \forall\, i = A, B$$

where v_i represents the weighted average wealth of the city: $v_i = \sum_{j \in i} k_j w_j \quad for\ i = A, B$ where w_j represents the wealth or economic status of institute j and k_i represents the "weight" of that institute in the city (the weight may be a function of different variables). $(1-L_i)$ is the fraction of the city's resources not used up in lobbying.

The probability a city receives funds is a function of a number of factors. The probability/proportion $\Pr_i$ is a positive function of the lobbying effort of city i and is negatively affected by the lobbying effort of city j. Moreover, $\Pr_i$ is negatively related to the wealth of city i, v_i and positively to the wealth of city j, v_j. As v_i increases city i is wealthier and thus will need less funds from the government. $\Pr_i$ is also a function of the information level the government has regarding the real needs of the cities. Denote this level by α. α is assumed to be identical for all cities. As α increases the probability/proportion of funds going to the city with the low *v*, that is to the needy, increases. Moreover, it is assumed that the size of the city is also a factor determining the probability of receiving the rents. The idea behind this assumption is that larger cities have more weight in effecting the decision making of the government (the larger the size of the city the more noise it can make and the more influence it has on election day). We can also think about this as the relative lobbying ability of the different cities. In order to simplify, we assume that this ability is a direct function of the size of the city. We normalize the size of city B to unity. Therefore, the effect of the size of city A is denoted by *d*. *d* is thus a positive function of the size of city *A*. To summarize these assumptions:

$$\frac{\partial \Pr ob_i(.)}{\partial L_i} > 0\ , \frac{\partial \Pr ob_i(.)}{\partial L_j} < 0, \frac{\partial \Pr ob_i(.)}{\partial d} > 0, \frac{\partial \Pr ob_j(.)}{\partial d} < 0,$$

(2) *and*

$$\frac{\partial \Pr ob_i(.)}{\partial v_i} < 0, \frac{\partial \Pr ob_i(.)}{\partial v_j} > 0.$$

Moreover, for $v_i < v_j$ it holds that $\frac{\partial \Pr ob_i(.)}{\partial \alpha} > 0$ *and* $\frac{\partial \Pr ob_j(.)}{\partial \alpha} < 0$.

More specifically we assume that *d* appears as a weight on to the lobbying effort. Each unit of lobbying has a larger effect in big cities than in small cities:

$$\left.\frac{\partial \Pr ob_A(dL_A, L_B)}{\partial \left(d L_A\right)}\right|_{L_b = dL_A} = \left.\frac{\partial \Pr ob_B(L_B, dL_A)}{\partial L_B}\right|_{L_b = dL_A}. \tag{3}$$

It is also assumed that there are decreasing marginal effects of lobbying:[2] $\frac{\partial^2 \Pr ob_A(dL_A, L_B)}{\partial \left(d L_A\right)^2} < 0$ *and* $\frac{\partial^2 \Pr ob_B(L_B, dL_A)}{\partial {L_B}^2} < 0.$

Moreover as $\Pr ob_A(dL_A, L_B) + \Pr ob_B(L_B, dL_A) = 1$ it holds that

[2] This ensures that the second order conditions hold.

(4) $$\frac{\partial^2 \Pr ob_A(dL_A, L_B)}{\partial \left(d L_A\right) \partial L_B} = - \frac{\partial^2 \Pr ob_B(L_B, d L_A)}{\partial L_B \, \partial \left(d L_A\right)}.$$

An illustration of a contest success function: *Luce's (Multinomial) Logit Model*

In order to understand our general results we illustrate them using a specific contest success function. Luce's (Multinomial) *Logit Model* postulates that the probability of an individual choosing a certain alternative *a*, from the set of alternatives *S*, $a \in S$, $\Pr_a$, is given by:

$\Pr_a = \dfrac{e^{q_a u(a)}}{\sum_{b \in s} e^{q_b u(b)}}$, where the parameter, $q_{a,}$ represents the central government's preferences (discrimination between cities, or in the present context, the weight assigned to the size of the city or the lobbying abilities of the city). If $q_b = 0$ for all *b,* then the all cities receive the same proportion of the total rent. Uncertainty increases if the government does not have full information regarding the city's real needs. In this setting, *u(a)* is the value attributed by the government to the city's needs. As stated above, cities invest effort in rent-seeking activities (to hide or reveal both their own and their opponents' actual needs from the government). The utility the government attributes to city *i* is given by $u(v_i, L_i)$. To simplify the calculations and obtain a closed form, let the utility be the logarithmic function, such that $u(v_i, L_i) = Ln\left(\frac{L_i}{v_i^{\alpha}}\right)$. Thus, utility increases with the city's increased investment in lobbying activity L_i and in the needs of the city, $\frac{1}{v_i^{\alpha}}$. The α-value represents the government's level of information regarding the city's real needs. As α increases, the government puts greater emphasis on the city's needs. If α=0, the government does not have any information regarding the city's needs and, thus, utility depends only on the city's investment in lobbying activities. If $\alpha = \infty$, then the government has full information about the cities' needs, which is exclusively used to make decisions about the division of the resources. This provides the following contest-success function, in which city *A*'s probability/proportion of rent received against city *B* is given by:

(5) $$\Pr_A = \frac{d\, L_A v_A \left(\frac{1}{v_A}\right)^{\alpha+1}}{d\, L_A v_A \left(\frac{1}{v_A}\right)^{\alpha+1} + L_B v_B \left(\frac{1}{v_B}\right)^{\alpha+1}} = \frac{d\, L_A \left(\frac{1}{v_A}\right)^{\alpha}}{d\, L_A \left(\frac{1}{v_A}\right)^{\alpha} + L_B \left(\frac{1}{v_B}\right)^{\alpha}},$$

where $(L_i v_i)$ is the value of lobbying and $(1/v_i)$ is the weight or the level of need of the city.

This contest success function is a variant of the non-discrimination rule of Tullock (1980) (see also Hirshleifer, 1989 and Hillman and Riley, 1989). The probability of winning the contest is therefore determined by: *(a)* The level of investment in lobbying activities, L_A and L_B; *(b)* The effect of the relative size of city A, d; *(c)* The wealth of the cities (representing the inverse of the cities needs), v_A and v_B. *(d)* The amount of information the government has regarding the needs of the different cities, α.

The optimal lobbying effort

Each city maximizes its expected payoff (equation (1)). The first order condition for maximization is given by:[3]

(6) $$G_i = \frac{E(U_i)}{\partial L_i} = -v_i + \frac{\partial \Pr_i}{\partial L_i} R = 0 \qquad \forall\, i = A, B\,.$$

The optimal lobbying effort of both parties satisfies:

(7) $$\frac{\partial \Pr_A}{\partial (d\, L_A)} = \frac{v_A}{d\, R} \qquad and \qquad \frac{\partial \Pr_B}{\partial L_B} = \frac{v_B}{R}\,.$$

Assuming an internal solution we denote the Nash equilibrium lobbying effort of both cities that solves (7) by L_A^* *and* L_B^*.

In our example we obtain that the optimal lobbying efforts of the cities are given by:

[3] Second order conditions are satisfied.

(8) $$L_A^* = \frac{d\,R\,v_A^{\alpha} v_B^{\alpha+1}}{\left(v_A^{\alpha+1} + d v_B^{\alpha+1}\right)^2} \quad and \quad L_B^* = \frac{d\,R\,v_A^{\alpha+1} v_B^{\alpha}}{\left(v_A^{\alpha+1} + d v_B^{\alpha+1}\right)^2}\,.$$

In equilibrium, if both cities have the same needs (i.e., the same *v*'s), but, city A is larger than city B (*d>1*), A will probably receive greater rents than B. From (7) it is clear that in equilibrium, $\frac{\partial \Pr^*{}_A}{\partial d\,L_A} < \frac{\partial \Pr^*{}_B}{\partial L_B}$ and thus $d\,L_A^* > L_B^*$. However, it is not clear whether the lobbying effort of city A, $L^*{}_A$, is greater or smaller than city B, $L^*{}_B$. As we can see from the example if $v_1 = v_2$, then $L_A^* = L_B^*$, however, $d\,L_A^* > L_B^*$.

In general it is not clear whether increasing *d* will increase or decrease L_A. For this reason we now examine the different properties of $L_A{}^*$ and $L_B{}^*$.

The effect of a change in the relative size of city A

We now consider the effect that a change in the size of *d,* the relative lobbying ability of city A, has on the lobbying effort of both cities. It can be shown that the Nash equilibrium in the determination of the lobbying effort of the cities satisfies:

(9) $$\frac{\partial L^*{}_i}{\partial d} = \frac{\frac{\partial G_i}{\partial L_j}\frac{\partial G_j}{\partial d} - \frac{\partial G_j}{\partial L_j}\frac{\partial G_i}{\partial d}}{\frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i}\frac{\partial G_j}{\partial L_j}} \qquad \forall\; i \neq j \quad i, j = A, B.$$

Thus,

(10)

$$\frac{\partial L^*{}_A}{\partial d} = \frac{1}{K}\left(\frac{\partial^2 \Pr_A}{\partial (dL_A)\partial L_B} d\,R\, \frac{\partial^2 \Pr_B}{\partial L_B \partial (L_A d)} L_A\, R - \frac{\partial^2 \Pr_B}{\partial L_B{}^2} R \left(\frac{\partial \Pr_A}{\partial (dL_A)} R + \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} L_A d\, R \right) \right)$$

where $K = d^2 R^2 \left(\frac{\partial^2 \Pr_A}{\partial (dL_A)^2} \frac{\partial^2 \Pr_B}{\partial L_B{}^2} - \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} \frac{\partial^2 \Pr_a}{\partial L_B \partial (dL_A)} \right)$. From (4) and the assumption regarding the decreasing marginal effect of an increase in lobbying activities we obtain $K > 0$. Equation (10) may be rewritten as follows

(11)

$$\frac{\partial L^*_A}{\partial d} = \frac{d R^2}{K} \left(\frac{\partial^2 \Pr_A}{\partial (dL_A) \partial L_B} \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} L_A - \frac{\partial^2 \Pr_B}{\partial L_B{}^2} \left(\frac{1}{d} \frac{\partial \Pr_A}{\partial (dL_A)} + \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} L_A \right) \right)$$

$$= \frac{d R^2}{K} \left(-L_A \left(\frac{\partial^2 \Pr_B}{\partial L_B{}^2} \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} - \frac{\partial^2 \Pr_A}{\partial (dL_A) \partial L_B} \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} \right) - \frac{1}{d} \frac{\partial^2 \Pr_B}{\partial L_B{}^2} \frac{\partial \Pr_A}{\partial (dL_A)} \right).$$

Note that for reasons stated above $\frac{\partial^2 \Pr_B}{\partial L_B{}^2} \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} - \frac{\partial^2 \Pr_A}{\partial (dL_A) \partial L_B} \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} > 0$, $\frac{\partial^2 \Pr_B}{\partial L_B{}^2} < 0$ and $\frac{\partial \Pr_A}{\partial (dL_A)} > 0$. Thus the sign of $\frac{\partial L^*_A}{\partial d}$ is ambiguous. However, $\frac{\partial L^*_A}{\partial d} < 0$ if $\frac{\partial \Pr_A}{\partial (dL_A)} < -\frac{\partial^2 \Pr_A}{\partial (dL_A)^2} L_A d$. Using the first order conditions as stated in (7) this condition can be presented as $v_A < -\frac{\partial^2 \Pr_A}{\partial (dL_A)^2} (L_A d)^2$. As we can see this condition depends on the values of v, d and the probability of A winning the contest.

Let us now consider the effect an increase in d has on the lobbying activities of city B:

(12)

$$\frac{\partial L^*_B}{\partial d} = \frac{1}{K} \left(\frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} d R \left(\frac{\partial \Pr_A}{\partial (dL_A)} + \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} L_A d R \right) - \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} d^2 R^2 L_A \right)$$

$$= \frac{1}{K} \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)} \left(\frac{\partial \Pr_A}{\partial (dL_A)} d R + \frac{\partial^2 \Pr_A}{\partial (dL_A)^2} \left(L_A d^2 R^2 - L_A d^2 R^2 \right) \right) = \frac{1}{K} \frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)}.$$

Thus the sign of $\frac{\partial L^*_B}{\partial d}$ equals to the sign of $\frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)}$ which can be either positive or negative. To summarize:

Claim 1: *The effect of a change in the lobbying ability, d, of city A on the lobbying activities of both cities is ambiguous.*

$$Sign\left(\frac{\partial L^*_B}{\partial d}\right) = Sign\left(\frac{\partial^2 \Pr_B}{\partial L_B \partial (dL_A)}\right) and\ \ if\ \ \frac{\partial \Pr_A}{\partial (dL_A)} < -\frac{\partial^2 \Pr_A}{\partial (dL_A)^2} L_A\, d\ \ then\ \ \frac{\partial L^*_A}{\partial d} < 0.$$

In our setting we think of *d* as the effect of the relative size of city A relative to city B. The lemma tells us that as city A becomes relatively larger than B, the lobbying effort of the two cities may increase or decrease. It is not clear how making the two cities more asymmetric will affect the lobbying effort of each of them.

In our example we obtain that :

$$(13)\quad \frac{\partial L^*_A}{\partial d} = \frac{R v_A^{\alpha} v_B^{\alpha+1}\left(v_A^{\alpha+1} - d v_B^{\alpha+1}\right)}{\left(v_A^{\alpha+1} + d v_B^{\alpha+1}\right)^2} \quad \text{and} \quad \frac{\partial L^*_B}{\partial d} = \frac{R v_B^{\alpha} v_A^{\alpha+1}\left(v_A^{\alpha+1} - d v_B^{\alpha+1}\right)}{\left(v_A^{\alpha+1} + d v_B^{\alpha+1}\right)^2}.$$

Therefore $Sign\left(\frac{\partial L^*_B}{\partial d}\right) = Sign\left(\frac{\partial L^*_A}{\partial d}\right)$. Moreover, $Sign\left(\frac{\partial L^*_B}{\partial d}\right) = Sign\left(\frac{\partial L^*_A}{\partial d}\right) \begin{smallmatrix} > \\ < \end{smallmatrix} 0$ if $\frac{v_A}{v_B} \begin{smallmatrix} > \\ < \end{smallmatrix} \sqrt[(\alpha+1)]{d}$. Without loss of generality assume that *d>1.* If $v_A < v_B$ then $Sign\left(\frac{\partial L^*_B}{\partial d}\right) = Sign\left(\frac{\partial L^*_A}{\partial d}\right) < 0$, otherwise the sign of the effect of a change in *d* is ambiguous. Thus,

Claim 1E: *Assuming that city A is larger than city B, if city A's needs are greater than those of city B, then the (relatively) larger is city A the less lobbying effort will be invested by both cities. However, if the needs of city A are less than those of city B, then it is not clear what effect the relative size of city A has on the lobbying effort of both cities.*

This result states that if city A is larger than city B and A's needs are greater, then both cities will decrease their lobbying efforts. City A has a natural advantage both via the size of the city and in terms of its needs.

The effect of a change in the needs of the cities

We now consider the effect of an increase the level of v on lobbying activities. It can be shown that the Nash equilibrium in the determination of the levels of lobbying of the cities satisfies:

(14)
$$\frac{\partial L^*_i}{\partial v_i} = \frac{\frac{\partial G_i}{\partial L_j}\frac{\partial G_j}{\partial v_i} - \frac{\partial G_j}{\partial L_j}\frac{\partial G_i}{\partial v_i}}{\frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i}\frac{\partial G_i}{\partial L_j}}, \quad \frac{\partial L^*_i}{\partial v_j} = \frac{\frac{\partial G_i}{\partial L_j}\frac{\partial G_j}{\partial v_j} - \frac{\partial G_j}{\partial L_j}\frac{\partial G_i}{\partial v_j}}{\frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i}\frac{\partial G_i}{\partial L_j}},$$

$$\frac{\partial L^*_j}{\partial v_i} = \frac{\frac{\partial G_j}{\partial L_i}\frac{\partial G_i}{\partial v_i} - \frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial v_i}}{\frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i}\frac{\partial G_i}{\partial L_j}} \text{ and } \frac{\partial L^*_j}{\partial v_j} = \frac{\frac{\partial G_j}{\partial L_i}\frac{\partial G_i}{\partial v_j} - \frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial v_j}}{\frac{\partial G_i}{\partial L_i}\frac{\partial G_j}{\partial L_j} - \frac{\partial G_j}{\partial L_i}\frac{\partial G_j}{\partial L_j}}.$$

Thus,

(15)
$$\frac{\partial L^*_A}{\partial v_A} = \frac{R}{K}\left(\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial L_B} d \frac{\partial^2 \Pr_B}{\partial L_B \partial v_A} - \frac{\partial^2 \Pr_B}{\partial {L_B}^2}\left(-1 + \frac{\partial^2 \Pr_A}{\partial(dL_A)\partial v_A} d\right)\right);$$

$$\frac{\partial L^*_A}{\partial v_B} = \frac{Rd}{K}\left(\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial L_B}\left(\frac{\partial^2 \Pr_B}{\partial L_B \partial v_B} - 1\right) - \frac{\partial^2 \Pr_B}{\partial {L_B}^2}\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial v_B}\right);$$

$$\frac{\partial L^*_B}{\partial v_B} = \frac{d^2 R}{K}\left(\frac{\partial^2 \Pr_B}{\partial(dL_A)\partial L_B}\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial v_B} - \frac{\partial^2 \Pr_A}{\partial(dL_A)^2}\left(\frac{\partial^2 \Pr_B}{\partial L_B v_B} - 1\right)\right);$$

and
$$\frac{\partial L^*_B}{\partial v_A} = \frac{R^2 d}{K}\left(\frac{\partial^2 \Pr_B}{\partial(dL_A)\partial L_B}\left(\frac{\partial^2 \Pr_A}{\partial L_A \partial v_A} - 1\right) - \frac{\partial^2 \Pr_A}{\partial {L_A}^2}\frac{\partial^2 \Pr_A}{\partial L_B \partial v_A}\right).$$

Under certain conditions we may know the effect of the change in the needs of one of the cities. For example, if $Sign\left(\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial L_B}\right) = -Sign\left(\frac{\partial^2 \Pr_B}{\partial L_B \partial v_A}\right)$ and $\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial v_A} < 0$ then $\frac{\partial L^*_A}{\partial v_A} < 0$. Thus

Claim 2: *A change in the needs of one of the cities has an ambiguous effect on the lobbying effort exerted by the cities.*

In our example:

$$(16)\ \frac{\partial L^*_A}{\partial v_A} = \frac{dRv_A^{\alpha-1}v_B^{\alpha+1}\left(-v_A^{\alpha+1}(2+\alpha)+adv_B^{\alpha+1}\right)}{\left(v_A^{\alpha+1}+dv_B^{\alpha+1}\right)^3},\quad \frac{\partial L^*_A}{\partial v_B} = \frac{(1+\alpha)Rv_A^{\alpha}v_B^{\alpha}\left(v_A^{\alpha+1}-dv_B^{\alpha+1}\right)}{\left(v_A^{\alpha+1}+dv_B^{\alpha+1}\right)^3},$$

$$\frac{\partial L^*_B}{\partial v_B} = \frac{dRv_A^{\alpha+1}v_B^{\alpha 11}\left(-v_B^{\alpha+1}(2+\alpha)+adv_A^{\alpha+1}\right)}{\left(v_A^{\alpha+1}+dv_B^{\alpha+1}\right)^3} \text{ and } \frac{\partial L^*_B}{\partial v_A} = \frac{(1+\alpha)Rv_A^{\alpha}v_B^{\alpha}\left(-v_A^{\alpha+1}+dv_B^{\alpha+1}\right)}{\left(v_A^{\alpha+1}+dv_B^{\alpha+1}\right)^3}.$$

We obtain that if $\frac{v_A}{v_B} \begin{matrix}<\\>\end{matrix} \sqrt[(\alpha+1)]{\frac{\alpha d}{2+\alpha}}$ then $\frac{\partial L^*_A}{\partial v_A} \begin{matrix}>\\<\end{matrix} 0$ *;*

and if $\frac{v_A}{v_B} \begin{matrix}>\\<\end{matrix} \sqrt[(\alpha+1)]{\frac{2+\alpha d}{\alpha d}}$ then $\frac{\partial L^*_B}{\partial v_B} \begin{matrix}<\\>\end{matrix} 0$.

Thus,

If $\sqrt[(\alpha+1)]{\frac{2+\alpha d}{\alpha d}} \begin{matrix}<\\>\end{matrix} \frac{v_A}{v_B} \begin{matrix}<\\>\end{matrix} \sqrt[(\alpha+1)]{\frac{\alpha d}{2+\alpha}}$ *then* $\frac{\partial L^*_A}{\partial v_A} \begin{matrix}>\\<\end{matrix} 0$ *and* $\frac{\partial L^*_B}{\partial v_B} \begin{matrix}<\\>\end{matrix} 0$.

If $\frac{v_A}{v_B} \begin{matrix}>\\<\end{matrix} \sqrt[(\alpha+1)]{d}$ then $\frac{\partial L^*_A}{\partial v_B} \begin{matrix}>\\<\end{matrix} 0$ and $\frac{\partial L^*_B}{\partial v_B} \begin{matrix}<\\>\end{matrix} 0$.

Therefore if $\sqrt[(\alpha+1)]{\frac{2}{\alpha d}+1} > \frac{v_A}{v_B} > \sqrt[(\alpha+1)]{d}$ then $\frac{\partial L^*_A}{\partial v_A} < 0$, $\frac{\partial L^*_B}{\partial v_A} > 0$ and $\frac{\partial L^*_A}{\partial v_B} < 0$, $\frac{\partial L^*_B}{\partial v_B} > 0$.

In other words,

Claim 2E: *If the needs of city A are sufficiently small, but not too small, then: (1) a decrease in the needs of city A will increase city A's lobbying effort and will decrease* *city B's effort. (2) a decrease in city B's needs will increase the effort of city A and will decrease city B's effort.*

In other words, with the value of *d* given, if the needs of city A are sufficiently small relative to that of city B, then a decrease in A's needs will make the two cities closer to each other in their needs. It is not clear what will happen to the total lobbying efforts of the cities as one has increased and the other has decreased its effort.

The effect of a change in the government's information level

Let us now consider the effect of a change in the level of information the government has regarding the cities needs, α, on the total lobbying effort, the rent dissipation, on the cities. In a similar way to (9) we obtain that:

(17)

$$\frac{\partial\left(L_A^* + L_B^*\right)}{\partial\alpha} = \frac{\partial L_B^*}{\partial\alpha} + \frac{\partial L_A^*}{\partial\alpha}$$

$$= \frac{dR^2}{K}\left(\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial\alpha}\left(\frac{\partial^2 \Pr_B}{\partial(dL_A)\partial L_B}d - \frac{\partial^2 \Pr_B}{\partial {L_B}^2}\right) + \frac{\partial^2 \Pr_B}{\partial(dL_B)\partial\alpha}\left(\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial L_B} - \frac{\partial^2 \Pr_A}{\partial(dL_A)^2}d\right)\right).$$

As we can see the sign of $\frac{\partial\left(L_A^* + L_B^*\right)}{\partial\alpha}$ is ambiguous. For example, in a symmetric case where $\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial\alpha} = -\frac{\partial^2 \Pr_B}{\partial(dL_B)\partial\alpha}$, $\frac{\partial^2 \Pr_B}{\partial(dL_A)\partial L_B} = -\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial L_B}$ and $\frac{\partial^2 \Pr_B}{\partial {L_B}^2} = \frac{\partial^2 \Pr_A}{\partial(dL_A)^2}$ then the effect of a change in the information level on the lobbying effort equals $\frac{\partial\left(L_A^* + L_B^*\right)}{\partial\alpha} = \frac{dR^2(1+d)}{K}\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial\alpha}\left(\frac{\partial^2 \Pr_B}{\partial(dL_A)\partial L_B} - \frac{\partial^2 \Pr_B}{\partial {L_B}^2}\right)$. If $\frac{\partial^2 \Pr_B}{\partial(dL_A)\partial L_B} > 0$ then $Sign\left(\frac{\partial\left(L_A^* + L_B^*\right)}{\partial\alpha}\right) = Sign\left(\frac{\partial^2 \Pr_A}{\partial(dL_A)\partial\alpha}\right)$. The reason for this ambiguity is that the partial derivatives depend on the actual values of the needs of both cities. Thus,

Claim 3: *It may well be the case that in an economy with a more informed government we will witness more lobbying effort rather than less. As the level of information regarding the cities' needs increases (up to a certain limit), the total lobbying activities also increases.*

The reason for this result is that increasing the government's information level may require more activity by one city to convince the government that the information is incorrect. This, of course, may cause the other city to also increase its lobbying effort.

In our example we obtain that the sum of lobbying effort for both cities equals,

$$(18) \qquad L_A^* + L_B^* = \frac{dRv_A^\alpha v_B^\alpha (v_A + v_B)}{\left(v_A^{\alpha+1} + dv_B^{\alpha+1}\right)^2}.$$

Therefore,

$$(19) \qquad \frac{\partial\left(L_A^* + L_B^*\right)}{\partial\alpha} = \frac{dRv_A^\alpha v_B^\alpha (v_A + v_B)\left(-v_A^{\alpha+1} + dv_B^{\alpha+1}\right)\left(Ln(v_A) - Ln(v_B)\right)}{\left(v_A^{\alpha+1} + dv_B^{\alpha+1}\right)^3}.$$

Without loss of generality assume $v_A > v_B$ ($Ln(v_A) > Ln(v_B)$): $\frac{\partial\left(L_A^* + L_B^*\right)}{\partial\alpha} \gtrless 0$ iff

$$\frac{Ln(d)}{Ln(v_A) - Ln(v_B)} - 1 \gtrless \alpha .$$

Claim 3E: *If the information level is not sufficiently high, then increasing the level of information will cause, at least one of the cities, to invest more effort in lobbying activities to offset the information the government has and to convince the government that the information it has is incorrect (this may of course lead the other city also to increase its effort). However, if the information level is sufficiently high, then the total lobbying effort will decrease as lobbying becomes less effective.*

A.2. Competition Inside the Cities

Let us now concentrate on the competition between the institutes within a city.

City A spent $L^*_A v_A$ in order to gain a proportion of Pr^*_A out of the total rent R. Thus, the net rent that city A has to divide between its institutes is given by: $r^*_A = \Pr^*_A R - L^*_A v_A$. To simplify we assume that there are only two institutes in each city (*i=1,2*) competing for the funds. There is no conflict between the assumption of having two institutes in each city and that the population size of the cities may differ. The expected payoffs for the institutes are given by:

(20) $$E(u_i) = w_i (1 - l_i) + g_i (\Pr^*_A R - L^*_A v_a),$$

where w_i is the economic status, wealth or the level of income of institute i, l_i is the lobbying effort of the institute and g_i is the probability/proportion that institute i will receive/win a payment. It is assumed that

$$\frac{\partial g_i(l_i, l_j)}{\partial l_i} > 0 , \frac{\partial g_i(l_i, l_j)}{\partial l_j} < 0, \frac{\partial g_i(l_i, l_j)}{\partial z} > 0, \frac{\partial g_i(l_i, l_j)}{\partial z} < 0,$$

(21) *and*

$$\frac{\partial g_i(l_i, l_j)}{\partial w_i} < 0, \frac{\partial g_i(l_i, l_j)}{\partial w_j} > 0,$$

where z is the weight assigned by the city to the needs of institute *i.* This may represent the relative size of this institute, the city's preferences or the lobbying capability of the institute. The city's information level regarding the needs of the institutes are given by β. It is assumed that as the city is more informed, an increase in β, the probability that the less well off institute will receive a larger part of the rent increases.

Each institute maximizes its expected payoff. The first order condition for maximization is given by: [4]

(22) $$\frac{E(u_i)}{\partial l_i} = -w_i + \frac{\partial g_i}{\partial l_i} r^*_A = 0 \qquad \forall\, i = 1, 2$$

[4] Second order conditions are satisfied.

where r_A^* represents the net rent available for the city.

The first order condition is satisfied when:

(23) $$\frac{\partial g_i}{\partial l_i} = \frac{w_i}{r_A^*} \qquad \forall\ i = 1, 2 .$$

Given that the marginal effect of lobbying on the probability of success decreases with an increase in lobbying effort (the second order condition is satisfied), we obtain that the higher is the net rent the more institutes invest in lobbying effort.

It is clear that the net rent facing city A is negatively related to the wealth of city A (an increase in v_A , a decrease in the needs of city A), is positively related to the wealth of city B, and positively related to the size of city A (d):

(24) $$\frac{\partial r_A^*}{\partial v_A} < 0, \quad \frac{\partial r_A^*}{\partial v_B} > 0 \quad and \quad \frac{\partial r_A^*}{\partial d} > 0 .$$

In our example we obtain that

(25) $$r_A^* \ = \ 2\frac{dRv_1^{1+\alpha}v_2^{2+2\alpha}}{\left(v_1^{1+\alpha} + v_2^{1+\alpha}\right)^3}$$

and it is clear that (24) holds.

Thus,

Claim 4: *As city A is larger relative to city B (its lobbying abilities are better than those of city B or the government prefers city A to city B) the net rent that city A receives increases and the lobbying effort by the institutes in city A also increases.*

B. Comparing One And Two Stage Lobbying Contests

We now compare the lobbying efforts that are extracted and the probability that institutes with the lower economic status will receive more funds in the two different situations: a two and one stage contest. As we can see from the claims developed above, such a comparison depends heavily of the parameters of the problem: the knowledge the government has verses the knowledge the cities have, the government's preferences, the cities preferences, etc. It may well be that the government prefers a certain city and the city prefers to help the less well off institute.

Claim 5: *In comparing the two-stage contest to a one–stage contest regarding the total lobbying effort and the probability that the institute in greater need will receive funds, we find that the outcome is ambiguous and depends directly of the parameters of the problem.*

In order to obtain some insights we will focus on an example. Assume that the contest success function in the contest between the institutes within the city is given by (in a similar way to the contest success function presented above):

$$(26) \qquad g_i = \begin{cases} \dfrac{z_A\, l_i \left(\dfrac{1}{w_i}\right)^{\beta_A}}{z_A\, l_i \left(\dfrac{1}{w_i}\right)^{\beta_A} + l_j \left(\dfrac{1}{w_j}\right)^{\beta_A}} & \text{for } i \neq j,\; i,j = 1,2 \\[2em] \dfrac{z_B\, l_i \left(\dfrac{1}{w_i}\right)^{\beta_B}}{z_B\, l_i \left(\dfrac{1}{w_i}\right)^{\beta_B} + l_j \left(\dfrac{1}{w_j}\right)^{\beta_B}} & \text{for } i \neq j,\; i,j = 3,4 \end{cases}$$

If we calculate the total expenditure of both institutes in each city we obtain in a similar way to (18),

$$(27) \qquad l_1^* + l_2^* = \frac{z_A r_A^{\;*}\; w_1^{\beta_A} w_2^{\beta_A} \left(w_1 + w_2\right)}{\left(w_1^{\beta_A+1} + z_A w_2^{\beta_A+1}\right)^2} \text{ and } l_3^* + l_4^* = \frac{z_B r_B^{\;*}\; w_3^{\beta_B} w_4^{\beta_B} \left(w_3 + w_4\right)}{\left(w_3^{\beta_B+1} + z_B w_4^{\beta_B+1}\right)^2}\,.$$

In order to understand the results consider the following case:

1. Both cities have the same population size and have the same lobbying abilities: $d=1$,
2. Cities have no preferences regarding the division of the rents between the institutes and all institutes have the same lobbying capabilities $z_A = z_B = 1$,
3. Institutes 2, 3 and 4 have the same wealth denoted by w ($w_2 = w_3 = w_4 = w$) and institute number 1's needs are twice as much as the others: $w_1 = 0.5w$,
4. The weighted wealth of a city is the sum of the wealth's' of the institutes: $v_A = w_1 + w_2$ and $v_B = w_3 + w_4$.
5. The information level of the cities and the government are the same and equal to 1: $\alpha = \beta_A = \beta_B = 1$.

In this situation we can calculate the total investment in lobbying effort in both stages by all four institutes and both cities and the expected payoff of worst-off institute (number 1).

B.1. A two-stage contest

Using (18) and (27) we obtain that the total expenditure and the payoff of institute 1 in the two stage equals:

(28) $$Total_{two} = \sum_{j=A,B} L_j^* + \sum_{i=1}^{4} l_i^* = 0.3811\frac{R}{w}$$

and

(29) $$E\left(u^*_1\right)_{two} = 0.5w + 0.1888524R.$$

B.2. A one-stage contest

Now let us consider the case where all four institutes lobby directly the government in a one-stage game. We assume that the contest success function is given by:

(30) $$f_1 = \frac{x_1\left(\frac{1}{w_1}\right)^{\beta}}{x_1\left(\frac{1}{w_1}\right)^{\beta} + x_2\left(\frac{1}{w_2}\right)^{\beta} + x_3\left(\frac{1}{w_3}\right)^{\beta} + x_3\left(\frac{1}{w_3}\right)^{\beta}}$$

and in a symmetric way the probability of the other three institutes are calculated. This function satisfies the general properties presented above.

Each institute maximizes its expected payoff. The first order condition for maximization is given by:

(31) $$\frac{E(u_i)}{\partial l_i} = -w_i + \frac{\partial f_i}{\partial l_i} R = 0 \qquad \forall\, i = 1, 2, 3, 4 .$$

Solving all four first order conditions together with the 4 simplifying assumptions, i.e. both cities have the same size of population and have the same lobbying abilities, institutes 2, 3 and 4 have the same wealth denoted by w ($w_2 = w_3 = w_4 = w$) and institute number 1's needs are twice as much as the others: $w_1 = 0.5w$ and $\beta = 1$, we obtain: $l_1^* = 0.35503\frac{R}{w}$, $l_2^* = l_3^* = l_4^* = 0.0710059\frac{R}{w}$. The total lobbying effort in a one stage game equals

(32) $$Total_{one} = \sum_{i=1}^{4} l_i^* = 0.568047\, \frac{R}{w}$$

and

(33) $$E\left(u^*{}_1\right)_{one} = 0.5\, w + 0.591716\, R .$$

Thus, under this example:

Claim 5E: *Total expenditure of the institutes is higher in the one-stage contest rather than in the two-stage contest. The expected payoff to the worst-off institute increases in a one-stage contest relative to what it would had achieved in a two-stage contest.*

The main reason for this result is that in the two-stage contest the net rent available to the cities for the institutes to compete for is after the city has spent part of the resources for *both* institutes and the institute that has the biggest needs pays the price of the lobbying of the city for the other institute as well.

So in this case:

Claim 6E: *If the government's objective is to help the worst-off institute as much as possible it prefers a one-stage contest. However, if the government prefers to minimize wasted resources on lobbying, then a two-stage contest is optimal. And if the government wises to receive as many resources as it can via lobbying activities (see Epstein and Nitzan (2002b)), then it prefers a one-stage contest.*

B.3. Information aspects in a two-stage contest verses a one-stage contest

One more important aspect that must be considered when comparing a one-stage contest to a two-stage contest is the information level the government has verses the information the city has regarding the economic status of the institutes. It is reasonable to assume that the city has more information than that of the government. Increasing information increases the probability that the correct institute receives the resources. However, increasing information, as we saw in Claims 3 and 3E, may increase the total wasted resources invested in lobbying activities. A two-stage contest has the advantage that after the city receives the resources it allocates the resources correctly with a higher probability than in a one-stage contest. However, the resources that the city receives may be low as the government lacks of information regarding the actual needs of the city.

B.4. Poverty Trap

Let us now consider the relationship between the city's payoff and the needs of the institutes. From (1), the expected payoff of city *i* in equilibrium is given by

(35) $$E\left(U_i^*\right) = \left(1 - L_i^*\right)v_i + \Pr_i^* R\ .$$

Consider the effect a change in v_i has on the equilibrium expected payoff:

(36) $$\frac{\partial E\left(U_i^*\right)}{\partial v_i} = -\frac{\partial L_i^*}{\partial v_i}v_i + \left(1 - L_i^*\right) + \frac{\partial \Pr_i^*}{\partial v_i}R\ .$$

As we know from the analysis presented above, $\left(1-L_i^*\right)>0$, $\frac{\partial \Pr_i^*}{\partial v_i}<0$ and the sign of $\frac{\partial L_i^*}{\partial v_i}$ is ambiguous.

Claim 7: *It is not clear whether increasing v_i increases or decreases the city's payoff.*

In order to illustrate this let us look at an example. Consider the case of city A where we normalize v_B to unity and $\alpha = 1$:

(37) $$E\left(U^*_A\right) = \left(1-L_A^*\right)v_A + \Pr_A^* R = \frac{v_A^5 + 2v_A^3 d + \left(v_A + R\right)d^2}{\left(v_A^2 + d\right)^2}$$

and

(38) $$\frac{\partial E\left(U^*_A\right)}{\partial v_A} = \frac{v_A^6 + 3v_A^4 d + 3v_A^2 d^2 + d^3 - 4v_A d^2 R}{\left(v_A^2 + d\right)^2}.$$

Trying to find a solution for this first order condition is not straightforward. We look at the second order condition and its sign:

(39) $$\frac{\partial^2 E\left(U^*_A\right)}{\partial v_A^2} = \frac{4\left(5v_A^2 - d\right)d^2 R}{\left(v_A^2 + d\right)^4}.$$

If $5v_A^2 > d$ then the expected payoff is U shaped and if $5v_A^2 < d$ the expected payoff has an inverse U shape. We illustrate this result using figure 1 in the following way: if the wealth of city A is sufficiently low, $v_A < v_{A1}$, then the city prefers to be wealthier, $\left(\left.\frac{\partial E\left(U^*_A\right)}{\partial v_A}\right|_{v_A<v_{A1}} > 0\right)$; however, if the wealth of city A is not sufficiently low or sufficiently high, $v_{A2} > v_A > v_{A1}$, the city gains from reducing its wealth level as the decreases in wealth would be lower than the increase in rents received from the government, $\left(\left.\frac{\partial E\left(U^*_A\right)}{\partial v_A}\right|_{v_{A2}>v_A>v_{A1}} < 0\right)$. If the city's wealth is sufficiently high,

$v_{A2} < v_A$, its gains from the lobbying activities are low and the city prefers to be wealthier.

If the wealth of city A is not sufficiently low or sufficiently high, $v_{A2} > v_A > v_{A1}$, it is optimal for the city to decrease its wealth in order to increase the expected payoff (moving to wealth level v_{A1} in figure 1).

The idea behind this result is that if the city is not wealthy it is beneficial to become worse-off which in turn increases the probability of receiving funds from the government (see Konrad, 1994, for a similar result in the case of the provision of public goods). The question is therefore: how can a city receive funds from the government and become worse-off or at least sustain its low income position? Becoming worse-off is easier than becoming economically better-off. Let us remember that the government and the cities do not have the same level of information. The cities are assumed to have more information regarding the needs of the institutes than the government. Thus the city can allocate the funds to the institutes that are not the worse-off ones, sustaining the low levels of the worse-off institutes. For example, funds that should go to education and health could go elsewhere. The city thus may be able to sustain low education and income levels of the average population. The lobbying system has therefore developed a *poverty trap* under which once you are in the trap the city would not wish to exit it. We may summarize this result in the following way

Claim 7E: *If the wealth of city A is not sufficiently low nor sufficiently high, the city prefers to allocate the funds it receives from the government in a way that sustains the low wealth of its population rather than allocating the funds in a way that increases its population's wealth.*

3. Conclusion

Governments do not have perfect information regarding the priorities and the needs of different groups in the economy. This lack of knowledge opens the door for different groups to lobby the government in order to receive the government's support. Such lobbying can be seen as rent-seeking activities – attempts by different groups to capture part of the rents that the government has to give out. Thus, it is not clear that the rents will be allocated properly according to the most needy or to maximize the social welfare. Rather, rents may be allocated to the efficient rent-seekers.

If the funds/rents are allocated to the efficient rent-seekers or those that invest a lot of effort and resources in rent-seeking activities, there are two efficiency losses: (*a)* the worst-off may not receive the funds and *(b)* a high rent dissipation, investment of effort and resources in rent-seeking activities, decreases the resources allocated to real production and thus decreases output. In an attempt to increase efficiency the central government may decentralize decision-making by allocating the rents to different cities. The cities, in turn, will allocate rents to the different groups within its district.

We analyze this decentralization of decision-making in a theoretical rent-seeking framework. We take into account the knowledge that the government has regarding the needs of the different groups and the information the city has regarding these groups. We also provide some insight into the question of how decentralization increases or decreases total rent-seeking activity, and how the level of information possessed by the government and the cities affects rent-seeking activity and the probability of receiving transfers.

A consequence of the lack of information and hierarchical contests may be the development of a poverty trap. In order to continue to receive transfers based on low economic status a city may deliberately allocate funds away from the worst-off so as not to better their position. Thus, in a lobbying contest, incentives my work in non-obvious ways.

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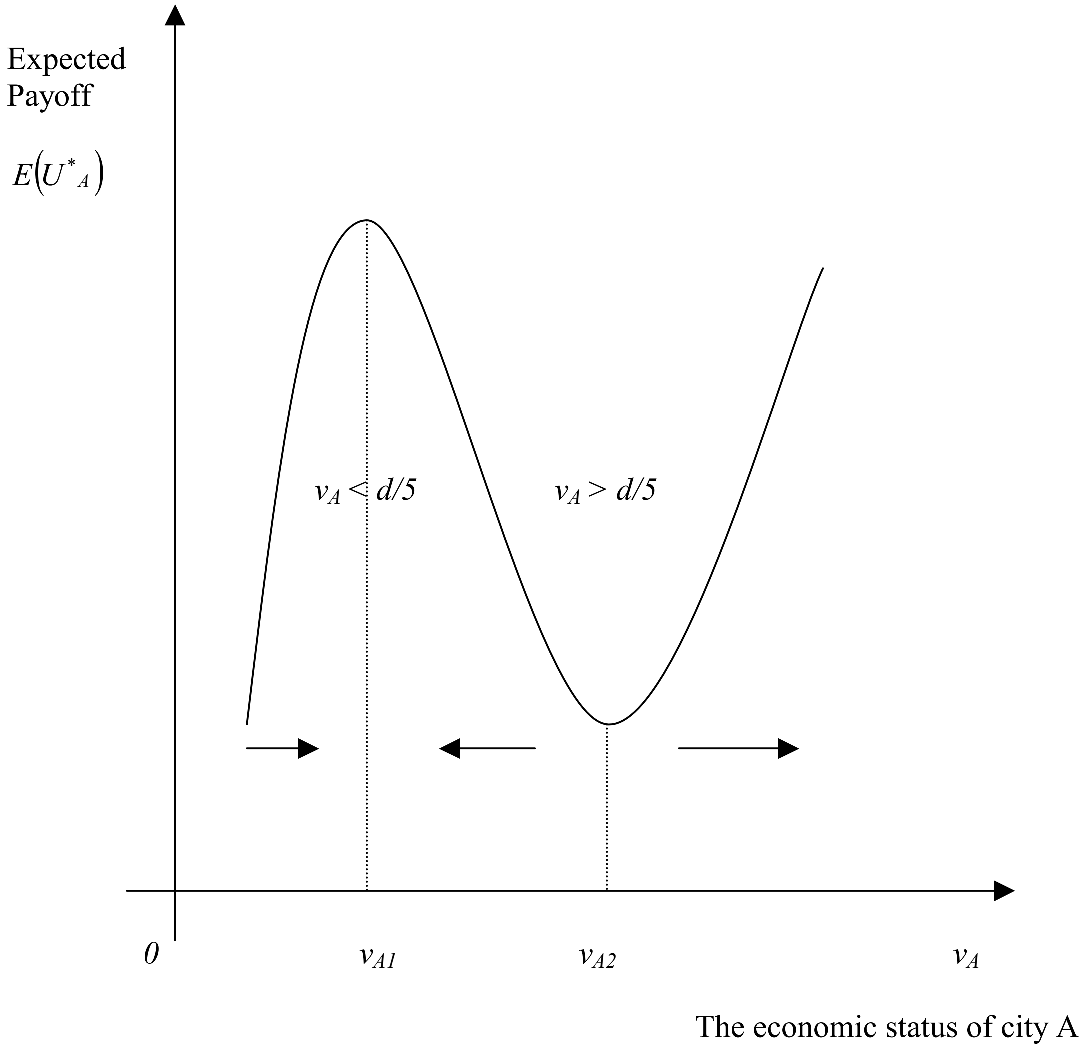
Figure 1



Expected
Payoff
$E(U^*_A)$
$v_A < d/5$
$v_A > d/5$
0
v_{A1}
v_{A2}
v_A
The economic status of city A