MANNHEIMER
ZENTRUM FÜR
EUROPÄISCHE
SOZIALFORSCHUNG

Working papers

The Impact of Communication Networks on Political Bargaining among Public and Private Organizations. Theoretical Conceptions and Empirical Evidence?

Christian H.C.A. Henning and Petri Uusikylä

AB II / Nr. 10
Mannheim 1995

ISSN 0948-0080

Arbeitspapiere

Christian H.C.A. Henning and Petri Uusikylä

The Impact of Communication Networks on Political Bargaining among Public and Private Organizations.

Theoretical Conceptions and Empirical Evidence?

Christian H.C.A. Henning, Petri Uusikylä:
The Impact of Communication Networks on Political Bargaining among Public and Private Organizations : Theoretical Conceptions and Empirical Evidence?
Mannheimer Zentrum für Europäische Sozialforschung (MZES).
Mannheim, 1995.
(Arbeitspapiere Arbeitsbereich II / 10)
ISSN 0948-0080

Deckblattlayout: Uwe Freund

Nicht im Buchhandel erhältlich
Schutzgebühr: DM 5,--
Bezug:
Mannheimer Zentrum für Europäische Sozialforschung (MZES), Postfach, 68131 Mannheim

<u>*Redaktionelle Notiz:*</u>

Dr. Christian H.C.A. Henning ist wissenschaftlicher Mitarbeiter in dem Forschungsprojekt "Analyse und Modellierung agrarpolitischer Entscheidungen in der Europäischen Union" des Arbeitsbereichs II am MZES. Petri Uusikylä ist wissenschaftlicher Mitarbeiter am Department of Political Science der Universität Helsinki. Das Arbeitspapier ist während eines Forschungsaufenthaltes von Petri Uusikylä am Mannheimer Zentrum für Europäische Sozialforschung vom 1.9.1994 bis zum 30.6.1995 entstanden.

<u>*Editorial Note:*</u>

Dr. Christian H.C.A. Henning is a research fellow at the MZES. Petri Uusikylä, who worked as a visiting scholar at the Mannheim Centre for European Research between September 1994 and June 1995, is a research assistant at the Department of Political Science at the University of Helsinki.

Content

Abstract

In this paper we present a game-theoretical model of political decision-making which takes into account actors' embeddedness in social networks. We first present a general framework of political decision-making which consists of two components: a) an institutional arena where political decisions are made by political agents according to their political preferences along a fixed institutional procedure and b) a social system where political actors try to influence political preferences of agents in order to maximize their utilities. We argue that these two arenas are interconnected and therefore should be modeled simultaneously. For this purpose we then introduce a policy game based on Harsanyi´s general N-person bargaining game. Given this theoretical framework we are able to derive meaningful hypotheses regarding the impact of communication networks on policy outcomes. In order to test these hypotheses we use empirical network data to develop and compute quantity indices corresponding to the actor's position in communication networks, which we interpret as the actor's political capital. Our data based on local government decision-making regarding cutbacks of public and private service agencies in the social and health sector. The econometrical tests support our main hypothesis *the greater the amount of political capital of an organization the less it will be cut back.*

Introduction

Recent developments in the field of policy network analysis have overcome some of the shortcomings of a purely metaphoric usage of concept of policy networks (for criticism see Kenis/ Schneider 1991; Dowding 1994). By integrating rational choice models of social exchange into the analysis of interorganizational networks, scholars of political science and political sociology have been able to combine the structural elements of the social system together with the strategic behavior of the actors participating in collective decision-making (cf. Pappi/ Kappelhof 1984; Marsden/ Laumann 1977; Laumann/ Knoke 1987; König 1992; Stokman/ Van den Bos 1992; Pappi/ König 1993, 1995; Knoke et al. 1995). The most important contribution of these works (most of them being applications of James Coleman's model of social exchange and collective decision-making (Coleman 1973; 1990)) is that they have connected policy networks more tightly to the concrete policy outcomes. According to most of the models, a main source of the capacity of non-governmental organizations to control policy outcomes has been observed in their ability to gain access to the governmental organizations. Thus, the final policy outcome is the result of the control of exchange in a perfect market, whereas the micro-level incentives of individual actors to exchange control resources are derived from their interest in different policy outcomes.

Even if most of these models provided further insight into the impact of social networks on policy outcomes as well as into political decision making processes itself, there are still some questions that have remained unanswered or at least problematic:

1. Since most of the models have their theoretical basis on the Coleman model , they unavoidably inherit the obvious theoretical shortcomings of the approach (see Kappelhoff 1993; Henning 1994a). Among others, one most important shortcoming of Coleman's collective decision model can be seen in its neglection of external effects of resource exchange, which indeed would lead to strategic interdependencies among actors (a more detailed treatise as well as a resolution of some shortcomings is provided by Henning 1994c).

2. The influence of non-governmental organizations on policy outcomes is only exogenously defined and measured by communication (access) structures among organizations. None of the models so far has provided a theoretical framework of individual action, which allows an endogenous derivation of a consistent concept of political influence. In practical terms, this means that if all organizations are only interested in the policy outcome which by constitutional rules is

determined by political agents (governmental organizations) alone, why should a rational political agent give up some institutional control to any other actor? Thus, a consistent theory of political action combining institutional arrangements and the agents' embeddedness in social networks has still not been provided in the literature. It has been assumed exogenously by Laumann and Knoke (1987), as well as Pappi and Kappelhoff (1984), that in addition to the institutional control other resources as well (e.g. information or expert knowledge), can determine policy outcomes and therefore they have interpreted all relevant resources as political control resources focusing on exchange of political control resources against other political control resources. Later König (1992) , Pappi/ König (1993 and 1995), Knoke et al. (1995) as well as Stokman and van den Bos (1992) have clearly distinguished the institutional power as a main determinant of policy outcomes from other resources, but focused only on the exchange of resources of the same type and, thus, have not modeled the exchange of different types of resources. This can be considered as a major shortcoming of the models, since only the last exchange provides a pure micro-theoretical basis for the analysis of political influence.

3. The communication network measures more or less a constant structure of access channels among organizations and not the actual communication or information flows between the actors. Thus, the communication networks measure only the overall capacity of potential communication, while according to the logic of the political exchange models the real communication flows determine the interdependencies among the actors. Stokman and van den Bos (1992, 224) are right in pointing out that the political exchange models „are defined solely in terms of control and interest and do not take into account the [social] structure among actors“. These models treat communication or access networks only as measures of the amount of valuable resources possessed by relevant actors, but do not consider the explicit exchange rate of different resources in relation to political control.

Problems mentioned above imply, that despite the fact that many empirical studies strongly suggest significant impact of communication structures among public (governmental) and private (non-governmental) organizations on policy outcomes, a theoretically consistent rational choice framework, from which this impact can be derived, is still lacking.

In this paper, we will present a game-theoretical model of political decision-making which takes into account actors' embeddedness in social networks. We begin by outlining a general framework of political decision-making in which the two stages of decision-making (i.e. the formal and informal) are modeled simultaneously. We will then introduce our policy-game based on Harsanyi's general

N-person bargaining game. This approach overcomes the main problems of exchange models mentioned above and allows a consistent derivation of theoretical meaningful hypotheses regarding the impact of communication structures on policy outcomes. In second part the general approach is specified in order to model the political decision-making of budgetary cutbacks in the Finnish city Rivertown as the outcome of political bargaining among local political, bureaucratic and private organizations. Finally in part three the political capital indices are developed corresponding to the game-theoretical approach and are empirically computed by using the communication network data of the Rivertown study (Uusikylä 1993b). On the basis of these indices the theoretical hypotheses regarding the impact of communication structures on political cutback decisions are statistically tested.

2 A game-theoretical model of political decision-making with social embeddedness

2.1 A general framework

A political decision can formally be defined as a collective decision of a set of actors (society or community), which is actually made by a smaller subset of political agents according to a fixed institutional decision procedure. Thus, technically a political decision can be defined as a collective and multidimensional decision of political agents. But, since the political agents are also socially embedded in a whole set of actors[1] and since most political decisions have an impact on the welfare of the whole set of actors, it follows that also other actors in a policy domain receiving a welfare corresponding to given policy outcomes try to influence the political decisions. All this is clear, but it still remains open how an actor, who is not a political agent, can exercise political influence.

Given these definitions and conventions, anyone attempting to model political decision making should overcome at least the following two problems:

A) How to model a collective decision process among political agents?

B) How to extend the previous model to include the political influence all actors exert on the subset of political agents?

To A: To derive a formalized theory of collective decision making by political agents, this decision should be defined along the following conditions:

(1) a group of political agents selects one and only one alternative out of the given set of alternatives which contains at least two elements by an institutionally fixed voting procedure (Γ)

(2) each of the agents mentioned in (1) possesses a consistent preference order over the given set of alternatives and

(3) the agents' individual votes are determined by their preference ordering

(4) the commonly chosen alternative will be implemented

[1] In general, these political agents are controlled implicitly by the larger set of actors via elections.

A decision α should be called multidimensional, if it can be divided into contextually distinguishable subdecisions α_h (h = 1,...,m; m $\in$ M), being denoted as issue dimensions in the following[2]. Thus, a collective decision of the political agents α can be interpreted as the determination of a position on each relevant issue dimension α_h.

Let $\alpha^* = (\alpha_h{}^*)$ denote the collectively selected positions and let $\succ_g$ denote the individual preferences of the political agent g (g = 1,...,n) over the set of issue dimensions M, it then follows:

$$\alpha^* = (\alpha_h{}^*) = \Gamma(\succ_g) \tag{1}$$

Thus, a theory of legislative decision-making among political agents has to provide a specification of the transformation function ($\Gamma(\succ_g)$) reflecting transformation of the vector of individual preferences of political agents into one commonly chosen policy outcome by a given institutionalized voting procedure. This has indeed turned out to be a very complex task. Despite some proposals (Coleman 1986, Black 1958, Enelow/ Hinich 1990; Stokman/ Van den Bos 1992) a sufficient positive theory of legislative decision making giving a general and consistent specification of ($\Gamma(\succ_g)$) is still not provided in the literature (see also Sen 1995). Since, we only aim to present a theoretical framework of political decision making that allows a consistent derivation of meaningful hypotheses regarding the impact of social embeddedness of political agents, we do not try to derive a complete specification of ($\Gamma(\succ_g)$), but, instead, will only assume some very commonly acceptable properties of this function:

1. We assume that for any given institutional voting procedure (Γ) a voting power (C_g) for each agent g can be defined.
2. Corresponding to the individual preferences of each political agent g we assume that these are at least weakly separable in the policy decision α, and thus can be represented by the following two stage utility function[3]:

$$\begin{aligned} &U_g(\alpha) = V^g(d^g) \\ &\text{with: } d^g = (D_{g1}(\alpha_1), \cdots, D_{gm}(\alpha_m)) \quad \text{and} \quad D_{gh}(\alpha_h) = 1 - \sqrt{(Y_{gh} - \alpha_h)^2} \end{aligned} \tag{2}$$

[2] For example, the political decision of a market reform (α) may be divided into the reduction of taxes on the agricultural output (α_1), of input price subventions (α_2) and the dismantling of existing marketing boards (α_3).
[3] Without the loss of generality it can be assumed that any α_h, $Y_{gh} \in (0,1)$.

Eq. (2) implies that each agent on the lower stage has a single-peaked preference over each issue dimension h, whereas Y_{gh} simply represents agent's preferred issue position. On the upper stage subutilities (derived from each issue dimension on the lower stage) are combined with unique utility index over the whole multidimensional policy outcome α according to macro-utility function V^g, which is assumed to be a well-behaved utility function in d^g[4].

3. Given the assumptions 1 and 2 the following vector-valued transformation function Ψ can be defined on the basis of $(\Gamma(\succ_g))$:

$$\begin{aligned}&\Psi(Y,C) = [\Psi_h(Y,C)] \equiv \Gamma([U_g(M)]) = \alpha^* \\ &\text{with: } Y=(Y^1,\cdots,Y^n); \quad C=(C_1,\cdots,C_n) \text{ and} \\ &Y^g = (Y_{g1},\cdots,Y_{gm}); \quad \forall g = 1,\cdots,n\end{aligned} \tag{2}$$

We further assume the following properties of Ψ:

$$\begin{aligned}&\text{(i)} \quad \frac{\partial \Psi_h}{\partial C_g}(\alpha_h^* - Y_{gh}) \geq 0 \quad \forall h \in M\ \forall g \in N \\ &\text{(ii)} \quad \frac{\partial \Psi_h}{\partial Y_{gh}} = \Psi_{gh}^d(C_g, Y_{gh}) \geq 0 \quad \frac{\partial \Psi_k}{\partial Y_{gh}} = 0 \quad \forall h,k \in M\ h \neq k\ \forall g \in N \\ &\text{(iii)} \quad \frac{\partial \Psi_{gh}^D}{\partial C_g} \geq 0 \quad \forall h \in M\ \forall g \in N \\ &\text{(iv)} \quad \forall h \in M\ \forall g \in N\ \exists\, Y_{gh}: \Psi_{gh}^d(C_g, Y_{gh}) > 0\end{aligned} \tag{3}$$

As regards content, property (i) implies that for every agent g a change that provides him with a higher institutional power will also shift the final legislative decision to the direction of his preferred position or at least leave the final decision unchanged. Property (ii) implies that if an actor g changes for whatever reason (see section 2.4 below) his politically preferred position regarding any issue dimension h the final legislative decision concerning this issue will be shifted to the same direction as the preferred position of actor g was changed or it will at least remain unchanged. In contrast, a change in the issue position h will have no effect on the political decision of any other issue dimension k≠h. Furthermore, by property (iii) it is assumed that the change is a non-decreasing function of the institutional control of the agent, while

[4] Note that under this assumption it follows straightforwardly that $U(\alpha)$ is a well-behaved utility function in the policy outcome α.

property (iv) implies that for every actor g there exists at least one feasible position $Y_{gh} \in (0,1)$ for which a positional shift has a significant impact on the final policy decision.

To B: According to the exposition given in section A, the concept of political influence can be introduced by assuming that the preference orderings of political agents are „conditional" preference orderings $\succ_g|^{S_g}$, where S_g denotes the vector of the relevant conditions. In practical terms, S_g can stand for the level of information of political agents or expected personal benefits, e.g. political support and career (reelection), social approval or even money, combined with the selected political position. Analyzing empirically political systems the assumption of more elaborated preferences seems appropriate. Furthermore, we claim that this assumption is the only micro-theoretical basis for a consistent definition of political influence of non-governmental organizations.

Thus, the political influence of an organization „I" is determined by its relative ability to influence the relevant conditions S_g, so that the conditional preference ordering of the powerful political agent will be in his favor. This can be done for example by providing valuable information for the political agent (see Knoke, et al.(1994); Pappi, König (1993)) or with political support or by threatening with the would-be activation of political opposition in the case of unfavorable political decision. Clearly, this influence process requires the deployment of special resources (δ), like e.g. money, time or expert knowledge. In general, single organizations differ not only with regard to the amount and type of resources used in the influence process, but also with regard to the efficiency of deployed resources. As far as the size of a group is concerned small homogeneous interest groups are more efficient than large and heterogeneous groups (Olson, 1969, 1985).

Moreover, recognizing that a successful influence effort generally requires the existence of an interaction channel between a political actor and agent, it follows quite plainly that actors having a strong position in a policy network c.p. are more efficient in their efforts to provide favorable conditional preferences of political agents. As will be seen in the following sections this fact can be taken as a starting point when deriving meaningful hypotheses regarding the impact of social networks among governmental and non-governmental organizations on policy outcome.

Given these conceptual definitions of political influence, the next fundamental question is: which organizations have to be taken into consideration as important actors explaining certain policies. Here, we generally follow the policy domain concept of Laumann/ Knoke (1987), although it should be pointed out that this concept is far from being indisputable. Since also organizations not operating in a given policy domain are likely to have at least an indirect incentive to influence domain specific policies to the extent that these policies consume scarce state resources, e.g. budget appropriations, that are also valuable in other policy domains. Overall, the whole process of political influence can be interpreted as a nested competition among all relevant governmental and non-governmental organizations for politically distributed welfare, where a general medium of this distribution can be seen in policy decisions of all policy domains. On the first stage a limited amount of resources (generally called state budget in the following) are distributed among different policy domains determining the welfare potential of each policy domain. Given the amount of public budget distributed to a policy domain on the first stage, the welfare distribution among all organization operating in one policy domain occurs on a second stage.

Since we are here only interested in measuring the relative political influence of organizations in a given policy domain, the analysis can be focused only on the second stage. Thus, in the following context α comprises only domain specific policies assuming a constant amount of available state budget for this policy domain.

Therefore, the solution of the political decision problem in a policy domain can be separated from policy decisions in other domains. Thus, the policy decision can be reduced to the simultaneous determination of domain specific policies α (constrained by a given state budget) and corresponding resource deployments (δ) of governmental and non-governmental organizations operating in the policy domain under concern[5]. As will be shown in the next section this scenario can be interpreted as a strategic interdependence between public and private organizations operating in a policy domain and thus can be determined by a general bargaining equilibrium.

[5] Again it should be emphasized that main structures of a policy domain might actually be determined by organizations which are not even operating in the particular domain but can on the upper stage restrict the amount of resources allocated to this domain in a state budget (see for example Krueger 1993).

2.2 A simple Two-Person Policy Game

Finally, the political scenario described above should be modeled as a cooperative N-Person bargaining game (see Harsanyi, 1969, 1977). To give a closer insight to the main properties of this relatively complex game, it is first assumed that there exists only one political agent G (agent in the following) and one additional actor I in a policy domain. In the following sections this basic game will be stepwise extended to the final N-person game, which is actually used as a theoretical framework in this paper.

The agent as well as actor I are considered as corporate actors. According to the expositions mentioned above, the agent controls the political outcome α and actor „I“ controls political resources δ_I that can be transformed into political support ($S^+_I(\delta_I)$) or opposition ($S^-_I(\delta_I)$) of the agent[6]. Furthermore, actor „I“ is assumed to have a given political transformation technology $F_I(\delta_I, K_I)$ with the following properties:

$$S_I = S_I^+ - S_I^- = F_I(\delta_I^+, K_I) - F_I(\delta_I^-, K_I), \tag{4}$$

$$\text{with: } \delta_I^+ + \delta_I^- = \delta_I ; \ \frac{\partial F_I}{\partial \delta_I}, \ \frac{\partial F_I}{\partial K_I} \geq 0 \text{ and } \left[\frac{\partial^2 F_I}{\partial \delta_I^2}\right] \text{ is negative-semidefinite}$$

K_I denotes an index of all valuable policy network positions occupied by actor „I“ and thus can be interpreted as the political (or social) capital of actor „I“ (see Coleman, 1990).

Moreover, the deployment of resources δ_I is concerned with the cost $C_I(\delta_I)$, where C_I is a non-decreasing convex function in δ_I. Generally, this cost reflects opportunities of the actor to employ his resources δ_I.

Consequently, given the values of control variables (α,δ) corresponding to the following welfare level of agent $u_G(\alpha,\delta)$ and of the actors $u_I(\alpha,\delta)$ respectively:

$$\begin{aligned} u_G(\alpha, \delta) &= U_G(S(\delta), Z(\alpha)) + B(\alpha) \\ u_I(\alpha, \delta) &= U_I(\alpha) - C_I(\delta_I) \end{aligned} \tag{5}$$

According to eq. (5) the agent's welfare can be separated into three different components. $S(\delta)$ corresponds to the utility received from the (net) political support of the actor. The second component $Z(\alpha)$ corresponds to an intrinsic preference of the agent over the set of issue

[6] In general S also can be interpreted as an index of all kind of benefits of the agent, e.g. providing valuable information, social approval or money to the agent, produced or reduced by the actor.

dimensions. Thus, by incorporating $Z(\alpha)$ it is assumed that apart from extrinsic motivations, e.g. expected political support, the agent has different preferences regarding given policies. The third component $B(\alpha)$ takes into account that the political budget is a general exchange medium to receive political support or intrinsic utility in other policy domains. The functions $U_I(\alpha)$ could be understood as the actor evaluation of the policy outcome.

This scenario can be interpreted as a general 2-person cooperative bargaining game defined by Nash (1953), where agent and actor simultaneously determine their control variable α and δ respectively. According to Nash (1953) the cooperative game is preceded by a non-cooperative game, where the disagreement payoffs $(t_G(\alpha,\delta),t_I(\alpha,\delta))$ are determined by the player's threat strategies $\tilde{\alpha},\tilde{\delta} \in \Sigma$, where $\Sigma = \Sigma_G x \Sigma_I$ denotes the joint strategy space of the agent and the actor. Given the disagreement payoffs the final solution of the cooperative game is the joint strategy $\alpha^*,\delta^* \in \Sigma$, for which the Nash product is maximized:

$$\alpha^*,\delta^* = \underset{\alpha,\delta \in \Sigma}{\mathrm{Max}} (u_G - t_G)(u_I - t_I) \tag{6}$$

Assuming some special properties of the feasible strategy space of the control variables (Σ) as well as of the payoff-functions $u_G(\alpha,\delta)$, $u_I(\alpha\delta)$, there always exists a Nash-solution for a general cooperative 2-person game with binding threats (Harsanyi 1977, 174), which is defined by the following conditions:

$$\begin{aligned}
&A_i \geq 0 \quad i = G,I \\
&A_G u_G^* + A_I u_I^* = \underset{\alpha,\delta \in \Sigma}{\mathrm{Max}} \left(A_G u_G(\alpha,\delta) + A_I u_I(\alpha,\delta)\right) \text{s.t.:} A_G, A_I = \text{const.} \\
&A_G (u_G^* - t_G) = A_I (u_I^* - t_I) \\
&c_i = t_i(\tilde{\alpha}^*, \tilde{\delta}^*) \\
&A_G t_G - A_I t_I = \underset{\tilde{\alpha} \in \Sigma_G}{\mathrm{Max}} \underset{\tilde{\delta} \in \Sigma_I}{\mathrm{Min}} \left(A_G u_G(\alpha,\delta) - A_I u_I(\alpha,\delta)\right) \text{s.t.:} A_G, A_I = \text{const}
\end{aligned} \tag{7}$$

According to general results in game theory a Nash solution of a cooperative 2-Person game derived from eq. (7) is all the more in favor of an agent i (see Harsanyi 1977, 179):

- the higher his own willingness, and the lower his opponent's willingness, to risk a conflict in order to obtain better conditions, which correspond to the shape (concavity) of their utility functions;

- the easier it is to transfer utility from the other player to player i, and the harder it is to transfer it other direction;
- the bigger the damage that player i could cause to his opponent in a conflict situation at a given cost to himself and the smaller the damage caused by the opponent to player i at given cost to himself.

In contrast, we are less concerned in this paper with the final payoff of the players, but instead focus more on the properties implying a final policy outcome α^*, which is to a large extent determined by the actors. This is a slightly different question, since the actor's low payoff could be combined with a policy outcome α^*, which is strongly in favor of the actor, due to very high influence cost $C_I(\delta^*)$. For this purpose consider the following first order condition derived from eq. (7) assuming that the Nash solution is not a corner solution:

$$
\begin{aligned}
&\text{(i)}\quad A_G, A_I > 0 \\
&\text{(ii)}\quad A_G\left(\frac{\partial B}{\partial \alpha_h^*}+\frac{\partial U_G}{\partial Z}\frac{\partial Z}{\partial \alpha_h^*}\right)+A_I\frac{\partial U_I}{\partial \alpha_h^*}=0 \quad \forall h\in M \\
&\text{(iii)}\quad A_G\left(\frac{\partial B}{\partial \tilde{\alpha}_h^*}+\frac{\partial U_G}{\partial Z}\frac{\partial Z}{\partial \tilde{\alpha}_h^*}\right)-A_I\frac{\partial U_I}{\partial \tilde{\alpha}_h^*}=0 \quad \forall h\in M \\
&\text{(iv)}\quad A_G\frac{\partial U_G}{\partial S}\frac{\partial F_I}{\partial \delta_I^*}-A_I\frac{\partial C_I}{\partial \delta_I^*}=0 \\
&\text{(v)}\quad -A_G\frac{\partial U_G}{\partial S}\frac{\partial F_I}{\partial \tilde{\delta}_I^*}-A_I\frac{\partial C_I}{\partial \tilde{\delta}_I^*}=0 \\
&\text{(vi)}\quad \frac{u_G^*(\alpha^*,\delta^*)-t_G(\tilde{\alpha}^*,\tilde{\delta}^*)}{u_I^*(\alpha^*,\delta^*)-t_I(\tilde{\alpha}^*,\tilde{\delta}^*)}=\frac{A_I}{A_G}
\end{aligned}
\qquad (8)
$$

According to eq.(8) the following statements can be made:

1. It follows directly from (iv) and (v) and from the properties of the social power function defined in eq. (4) that the actor will choose a reward strategy in case of cooperation ($\delta^*=\delta^+$) and a penalty strategy in case of conflict ($\tilde{\delta}^* = \delta^-$).
2. Analogously, (ii) and (iii) imply that the agent will choose in case of cooperation a policy outcome that is budget consuming $\left(\frac{\partial B}{\partial \alpha_h} \le 0\right)$ or that lies between the preferred position[7] of

[7] In this statement it is assumed that both the preferences of the agent ($Z(\alpha)$) and of the actor ($U_I(\alpha)$) over each issue dimension h can, at least around the solution point, also be represented by a single-peaked utility function.

the agent and the actor $\left(\frac{\partial Z_G}{\partial \alpha_h} \cdot \frac{\partial U_I}{\partial \alpha_h} \leq 0\right)$. In the case of conflict the agent chooses a budget increasing policy outcome $\left(\frac{\partial B}{\partial \alpha_h} \geq 0\right)$ that lies as far away as possible from the preferred position of the actor, thus not between agent and actor $\left(\frac{\partial Z_G}{\partial \alpha_h} \cdot \frac{\partial U_I}{\partial \alpha_h} \geq 0\right)$.

3. The equilibrium policy outcome α^* is c.p. more in favor of the actor the higher his ability to provide political support or other favors to the agent in the case of cooperation (respectively to damage the political agent in the case of conflict) at given cost to himself, and the smaller the damage that the agent can cause to the actor at given cost to himself by unfavorable policy decisions. Furthermore, the equilibrium policy outcome α^* is the more in favor of the actor, the smaller the actor's risk attitude towards a conflict is in relation to the risk attitude of the agent.

4. The actor's ability to produce political favors or disfavors for the agent is the higher the more efficient his social transformation function $F_I(\delta_I,K_I)$ is, which is according to eq. (4) mainly determined by his amount of social capital (K_I), e.g. favorable network positions. Furthermore, it is the higher the higher the preferences of the agent for political favors S, which correspond to a relatively high marginal utility dU/dS at every consumption point (α,S).

5. Obviously, the cost of the actor to damage the agent corresponds to his opportunity costs $C_I(\delta_I)$, while the cost of the agent to damage the actor are mainly determined by his intrinsic preferences $Z(\alpha)$ and the resulting state budget $B(\alpha)$. If the preferred position of the agent favors also the actor or if the budgetary effects are unfavorable or of minor importance to the agent, he will be in a relatively weak position to damage his opponent, since according to the equilibrium condition of the game (see also Harsanyi 1977, 178) the agent will only switch to another conflict strategy, if this conflict strategy will increase (decrease) the conflict cost of the actor (u_I^* - t_I) to a higher (lower) proportion than his own conflict cost (u_G^* - t_G).

6. The attitude towards risk generally corresponds to the shape of the utility functions (see Osborne/ Rubenstein 1990). Due to the assumed additivity of utility functions (see eq. 5)

the actor's willingness to risk a conflict compared to the willingness of the agent is the higher, the lesser concave his utility function $U_I(\alpha)$ and the lesser convex his cost function $C_I(\delta)$ are and the more concave the utility function of the agent $u_G(\alpha,\delta)$ is.

2.3 A policy game incorporating one political agent and multiple actors

If we now assume that there are (n-1) additional actors besides the political agent, the political scenario can be interpreted as a general cooperative N-person game, for which Harsanyi (1969; 1977) has proposed a generalized Nash solution concept. We shall not go into the details of this extremely complex concept, but will only discuss its main structure and analyze the impact of networks on the genesis of political influence in this context.

Likewise in section 2.2 it is assumed that each actor I=1,...,(n-1) controls political resources δ_I, which can be transformed into political support (S_I^+) or opposition (S_I^-) according to the political power function $F_I(\delta_I,K_I)$, which is for each actor I defined according to eq. (4). Furthermore, each actor I possesses the payoff function $u_I(\alpha,\delta)$ as defined in eq. (3). The political agent controls the policy outcome α and has the payoff function $u_G(\alpha,\delta)$ defined in eq.(3), where it is additionally assumed that the agent is indifferent regarding the political support received by different actors, e.g. $S = \sum_I S_I$ [8].

According to Harsanyi (1969; 1977) the solution of the overall game can be derived from the recursive solution of non-cooperative subgames defined among all possible coalitions of the n players. In each subgame the cooperative payoff of a coalition is divided amongst it's members according to payoffs that each actor has received from the lower order subgames (for detail see Harsanyi 1977, pp. 244 and also Zusman (1976)). Let N ={G,1,...,(n-1)} denote the set of all players, R a subset of N and $\bar{R} = N \setminus R$ the complement of R in N. Further, let $\tilde{\sigma}^R$ respectively $\tilde{\sigma}^{\bar{R}}$ denote the commonly chosen threat strategy of coalition R and $\bar{R}$, respectively and let σ denote the final equilibrium strategy commonly chosen by all players $i \in N$. Let also u_i^R denote the payoff player i received from coalition R, while t_i^R denotes the sum of all dividends w_i^V

[8] Generally, it seems to be more reasonable to assume that the agent is not indifferent regarding the favor or disfavor received from different actors. For example this seems to be straightforward, if one focuses on social approval received from different actors. In this case it seems to be reasonable to assume different preferences for different actors. But, even in this case it is always possible to define a so-called standard unit of favor, which is homogeneous, and assuming different efficient technologies to produce this standard unit of favor for actors, differently preferred by the agent.

player i received from all subcoalitions $V \subset R$ of which i is a member. Then the final solution of the game is determined by the following conditions (Harsanyi 1969; 1977):

$$A_i \geq 0 \quad i \in N$$

$$\sum_{i \in N} A_i \, u_i^N = \underset{\sigma \in \Sigma}{\text{Max}} \sum_{i \in N} A_i \, u_i^N(\sigma)$$

$$u_{iI}^R = u_i^R(\tilde{\sigma}^R, \tilde{\sigma}^{\overline{R}}), \quad i \in R, \; R \subseteq N$$

$$A_i (u_i^N - t_i^N) = A_j (u_j^N - t_j^N) \quad \forall i, j \in N$$

$$t_i^R = \sum_{\substack{V \ni i \\ \overline{V \subset R}}} w_i^V = \sum_{\substack{V \ni i \\ \overline{V \subset R}}} (-1)^{r-v+1} u_i^V \quad r > 1, \; i \in R, \; R \subseteq N$$

$$\sum_{i \in R} A_i \, u_i^R(\tilde{\sigma}^R, \tilde{\sigma}^{\overline{R}}) - \sum_{j \in \overline{R}} A_j \, u_j^{\overline{R}}(\tilde{\sigma}^R, \tilde{\sigma}^{\overline{R}}) =$$

$$\underset{\tilde{\sigma}^R \in \Sigma_R}{\text{Max}} \; \underset{\tilde{\sigma}^{\overline{R}} \in \Sigma_{\overline{R}}}{\text{Min}} \sum_{i \in R} A_i \, u_i^S(\tilde{\sigma}^R, \tilde{\sigma}^{\overline{R}}) - \sum_{j \in \overline{R}} A_j \, u_j^{\overline{R}}(\tilde{\sigma}^R, \tilde{\sigma}^{\overline{R}}) \quad R, \overline{R} \subseteq N \qquad (9)$$

$$\text{s.t.:} \; A_i (u_i^R - t_i^R) = A_k (u_k^R - t_k^R), \quad \forall i, k \in R$$

$$A_j (u_j^{\overline{R}} - t_j^{\overline{R}}) = A_m (u_m^{\overline{R}} - t_m^{\overline{R}}), \quad \forall j, m \in \overline{R}$$

In principal, the properties of the Nash solution of the N-Person game defined by eq. (9) correspond to the properties of the Nash solution of the 2-Person game defined by eq. (7). But, for the N-Person game there are two additional aspects. First, since there is more than one actor, the final policy outcome is all the more in favor of an actor I, if he has a relatively efficient social power function, e.g. a relatively favorable policy network position, compared to the other actors, since there is a competition for political influence among all actors. Also, his willingness to risk and his conflict cost should be relatively favorable , not only compared to the agent, but also to all other actors. The second and main extension compared to the simple 2-person game can be seen in the impact of coalition building on the final outcome. According to the logic of Harsanyi's solution concept the final policy decision will be the more in favor of an actor the more he is able to build favorable coalitions. Technically, this can be seen from eq. (9), since the disagreement payoff of an actor i (t_i^N) regarding the final cooperative decision (σ) of the whole set of players N is just the sum of the dividends w_i^V actor i received from all subcoalitions $V \subset N$ of which he/she is a member. Here, we can introduce another aspect regarding the impact of communication networks on policy outcomes. While the expositions stated earlier are mainly focused on the impact that actors' communication channels have to the political agent determining the relative effectiveness of their political power function, the ability to build favorable coalitions can also be determined on the basis of communication channels from one actor to another. To include this extension, we will introduce one minor modification to our N-Person game by assuming in addition that the degree of cooperation in a coalition is determined by the trust amongst its members. This can be done by assuming (in contrast to the game described above) that trust is not free for the members of a coalition, but according to the social relation among the members is concerned with some transaction costs to ensure the establishment of binding (thus cooperative) strategies within the coalition[9]. Formally, this implies that the joint payoff (characteristic function) of a coalition respectively the individual dividends will be reduced according to the costs corresponding to the trust establishment within the coalition. In this context, it seems reasonable to assume that the closer the social relation among the coalition members the lower the cost of trust-establishment. Therefore, we assume that trust establishment is a function of the communication structure among the coalition members, where more cohesive communication structures in a coalition imply lower costs to establish trust amongst its members and therefore a lower reduction of the joint payoff. Let K_R denote an index of communication strength[10] in a given coalition and let $Q^R(K_R)$ denote the cost function of trust-establishment in a coalition R. Then the concept of trust-establishment can be introduced into the N-person game defined above by adjusting the joint payoff function of each coalition R ($U^R = \sum_{i \in R} a_i\, U_i(\tilde{\sigma}^R, \tilde{\sigma}^{\bar{R}})$) by subtracting the trust establish cost $Q^R(K_R)$. Obviously, it follows quite plainly according to the new N-person game that c.p. the final policy outcome will be the more in favor of an actor I the more favorable are his communication structures not only to the agent, but also to other actors.

At this stage another extension of the basic N-person game should be discussed, that also focuses on communication structures among the actors. Interest mediation by so-called brokerage activities is a well-known factor in real world political systems (see Knoke 1990; Pappi/ König 1995). A political brokerage position therefore refers to a political interest intermediation process in which a non-governmental organization with established connection to government (or any decision body) represents also the interests of another organization (governmental or non-governmental) with a similar interest structure. Prominent brokers are

[9] The impact of communication networks on cooperative games have already been discussed in the literature (see Myerson 1977; Owen 1986; Rosenthal 1988). The idea presented above is mainly influenced by this work.
[10] Rosenthal (1988) suggested a concept and computation method for this index on the basis of weighted communication matrices.

often peak-organizations, like the German DGB of the German labor unions (see Knoke et al. 1995; Pappi/ König 1995) or the COPA as the European organization of all national farmer lobbies, or interest groups with broader, heterogeneous clients.

One possibility to incorporate brokerage activities into the N-Person policy game defined above would be to include brokerage relation when computing the political capital indices from the political communication matrices. This, however, does not give any micro-theoretical basis for brokerage activities, but only provides a plausible tool for empirical interpretation. In this context, Henning (1994b and 1994c) suggested a solution by introducing a nested political power function into the N-person game incorporating broker activities of the European peak-organizations in the agricultural policy domain. Since this approach can not be applied to more generally include all kinds of broker activities, we propose another way of incorporating explicitly brokerage activities into the game. For this purpose we introduce broker B as an additional type of a player.

Broker B (like any other actor) controls some resources δ_B, which generally can be transformed into favors or disfavors of the political agent according to the political power function $F_B(\delta_B,K_B)$, which is analogously defined to eq.(4). Thus, K_B denotes the political capital index corresponding to favorable network positions occupied by broker B. The main difference between a broker and an actor discussed above is that a broker also uses his political resources to represent the interests of other organizations. This, however, does not suggest that a broker acts in an altruistic behavioral mode, but rather can and should be understood as a rational, individual utility maximizing behavior taking into account, again, the social embeddedness of the broker. One should also notice that brokers are more or less dependent on actors due to their interest in valuable resources controlled by these actors. Thus, we assume that the actors also possess some resources $\delta^B{}_I$ that they can transform into favors (S^{B+}) or disfavors (S^{B-}) of a broker B according to a transformation function $F^B{}_I$ ($\delta^B{}_I$, K_I) defined as in eq.(4) above.

These dependencies of brokers on actors can be incorporated into the formal model by assuming the following payoff functions for each single player type [broker (B), agent (G) and actor (I)]:

$$\begin{aligned} u_B(\alpha,\delta) &= U_B\left(S^B(\delta^B), Z^B(\alpha)\right) - C_B(\delta_B) \\ u_G(\alpha,\delta) &= U_G\left(S^G(\delta^G), Z^G(\alpha)\right) - B(\alpha) \\ u_B(\alpha,\delta) &= U_I(\alpha) - C_I(\delta_I) \end{aligned} \tag{10}$$

In eq.(10) $S^B(\delta^B) = \sum_I S_I^B(\delta_I^B)$ respectively $S^G(\delta^G) = \sum_I S_I^G(\delta_I^G) + \sum_B S_B^G(\delta_B)$ denote the net support of the broker B and the agent respectively, where $\delta^B{}_I$ and $\delta^G{}_I$ are the resource input of an actor I into the production of net support of the broker B as well as the agent. This holds for every actor I: $\delta_I^G + \sum_B \delta_I^B = \delta_I$. According to eq.(10) the utility of the broker and according to eq. (5) the welfare of the agent can be separated into three different components. $S^B(\delta^B)$ corresponds to the utility received from the (net) support of the actor. The second component $Z^B(\alpha)$ corresponds to the broker's evaluation of the policy outcome. The third component $C_B(\delta_B)$ consists of the costs that arise when producing political influence on the agent.

Overall, taken the expositions above into account, the impact of communication structures on policy outcome can be separated into three different components (1) favorable communication structures to the agent (direct political influence), (2) to brokers who themselves have favorable communication structures to the agent (indirect political influence) and (3) to other actors (collective political influence over coalition building).

2.4 A policy game incorporating multiple political agents and multiple actors

In order to avoid the most difficulties in providing a theory of legislative decision making we have so far assumed that there exists only one political agent who controls the policy outcome. As stated in section 2.1 the main concern of this paper is to provide a theoretical model of policy decision-making that allows to derive meaningful hypotheses regarding the impact of communication networks (channels) on policy outcome. To introduce multiple political agents we follow the expositions made in section 2.1. Thus, there exist multiple political agents and according to given institutional rules each agent G has a fixed institutional power C_G .

Furthermore, we assume that each agent G controls a set of political preferred position[11] (Y^{P}_{gh}, h=1,...,m) and that the final policy decision α can be determined by the political preferred positions (Y^{P}) and institutional control (C) of the agents according to the transformation function Ψ with the properties defined in eq. (4) section 2.1:

$$\begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_m \end{bmatrix} = \Psi(Y^P, C) = \begin{bmatrix} \Psi_1(Y^P, C) \\ \vdots \\ \Psi_m(Y^P, C) \end{bmatrix} \tag{11}$$

Since there are multiple agents as well, one could also expect that the agents too have communication ties of social relations with each other. Thus, following the line of argumentation given above, regarding the social embeddedness of the political agent in the set of actors, it seems to be straightforward that social relations among different political agents also have an impact of the final policy outcome (for empirical support of this hypothesis see for example Laumann/ Knoke 1987; Pappi/ König 1995). To model the impact of this, we assume that as actors each political agent G also controls some resources $\delta_G^{G'}$ that can be transformed into political favor ($S_G^{G'+}$) or disfavor ($S_G^{G'-}$) of another agent G´ according to his political (social) power function $F_G^{G'}(\delta_G^{G'}, K_G)$ defined as in eq. (5) above. K_G therefore denotes the political capital index of the agent G corresponding to favorable policy network positions of agent G.

Now we are able to define the final N-Person policy game with multiple actors and political agents incorporating the institutional framework and social embeddedness of the legislative decision-making process, which can be used as a basis for a theory of political decision-making.

Let N_G, N_I and N_B be the numbers of political agents, actors and brokers, respectively with $N=N_G + N_I + N_B$. Each agent G = 1,...,N_G has a given institutional power C_G and controls a set of preferred political policy positions (Y^{P}_{gh}) as well as some resources δ_G, each actor I= 1,...,N_I

[11] Note that politically preferred positions correspond to a position that an agent decides to represent in the political battle. Obviously, any agent is free to choose such a position and therefore controls his politically preferred positions. Additionally, each political agent might also have individual (intrinsic) preferences regarding policitical issue dimensions, that might be represented by single-peaked utility functions (see eq. (2)). Thus, preferred issue positions (Y_{gh}) can be defined for each agent G and each issue dimension h. But, contrary to the politically preferred positions (Y^{P}_{gh}), preferred positions (Y_{gh}) as real preferences are exogenously fixed and can never be controlled by any agent. Otherwise one would explicitly assume the existence of a situation where the political system could be turned to the optimum just by changing one´s preferences.

controls some resources δ_I and each broker B= 1,...,N_B controls some resources δ_B. According to the transformation function Ψ and to the political power functions defined above all players commonly determine their payoff according to their payoff functions:

$$\begin{aligned} u_G(\alpha, \delta) &= U_G\left(S^G(\delta^G), Z^G(\alpha)\right) - B(\alpha) - C_G(\delta_G) \quad \forall G = 1,\dots,N_G \\ u_I(\alpha, \delta) &= U_I(\alpha) - C_I(\delta_I) \quad \forall I = 1,\dots,N_I \\ u_B(\alpha, \delta) &= U_B\left(S^B(\delta^B), Z^B(\alpha)\right) - C_B(\delta_B) \quad \forall B = 1,\dots,N_B \end{aligned} \tag{12}$$

This scenario of strategical interdependence among all players comprising simultaneously both a competition among all actors and brokers for political influence and a competition among all political agents and brokers for favors, e.g. political support, expert information or even social approval and money, can be interpreted as a general cooperative N-Person bargaining game. Applying the solution concept of Harsanyi the final Nash solution of this game is determined by the conditions resulting from eq. (10) substituting the payoff functions eq.(12)[12].

2.5 Summary of the game-theoretical framework

In this chapter we have stepwise extended our bargaining model by starting from a simple two-person policy game and adding then more actors and finally more agents in it. Overall, the following conclusions can be drawn from the game-theoretical approach derived:

1. Formally, a political decision is considered as a collective multidimensional decision of political agents, who are entitled to make decisions for a larger set of actors. To be precise each decision by the agent is made according to a fixed institutional voting procedure, where each agent follows his political preferences. Contrary, to institutional power, which is defined as the ability of political agents to determine policy outcome derived from institutional rules, political influence applies only in the context of social embeddedness of the political agents. Formally, agents' social embeddedness corresponds to the fact that agents are not only interested in policy outcomes, but also in other resources, (e.g. political support) partly controlled by actors or other agents. This implies conditional political

[12] Additionally, to incorporate the process of trust establishment the cost function $Q^R(K_R)$ have to be subtracted from the common payoff function $U^R = \sum_{i \in R} a_i \, U_i(\tilde{\sigma}^R, \tilde{\sigma}^{\bar{R}})$ of a coalition R.

preferences of the agents, where the conditions are partly determined by actors. A measurement of political influence is provided by the efficiency of political (social) power functions of an actor. The more efficient an actor is in producing favorable conditions for institutional powerful agents compared to other actors, the higher is c.p. his political influence. Since each influence effort demands the existence of direct or indirect (via brokers) interaction channels to political agents, a main determinant of this technical efficiency is seen in actors' positions in political communication networks. Formally, since the actors' communication structures are taken as quasi-fix inputs in the political power function, they are interpreted as political capital.

2. According to the final policy game with multiple political agent and actors, one can identify three different components determining the final policy outcome: (1) preferences of the players (agents, actors and brokers), (2) institutional framework (3) social framework. Particularly, the preferences comprises of risk attitude of all players, intrinsic and extrinsic preferences of political agents and brokers. The institutional framework captures the institutional power of political agents (C), the strategy space of feasible politically preferred issue positions of each agents and the properties of the transformation function Ψ, while the social framework includes the actual communication structures and properties of the political power functions.

3. Thus, according to the conditions of the Nash solution (eq. 13) the final policy outcome will be the more in favor of an actor the more these three components (preferences, institutional and social framework) are in favor of these actors. As regards content this particularly implies the following positive impact of network structures on the final policy outcome: *"The more favorable an actor's communication channels are, (i.e. the more established communication channels to powerful agents respectively to influential brokers an actor controls) the more favorable is ceteris paribus the final policy outcome to him/her.* As pointed out in section 2.3 there is an additional component regarding the impact of communication structures on policy outcome focused on the trust building process in coalitions, that is on horizontal communication ties between actors. Referring to our theoretical discussion one would assume that the final policy outcome is the more in favor of an actor the more it c.p. has horizontal communication ties to other actors. It should be noticed that this aspect is not captured by our measurement of political capital, which focuses on the actor-agent respectively actor-broker-agent communication patterns.

One should also notice that apart from political communication structures there exist many other preferential, institutional and social determinants having an impact on the final policy outcome. For example, the final policy outcome is also likely to be more in favor of an actor:

- the higher his willingness to risk a conflict compared to all other players ;
- the closer his preferred policy positions are to the intrinsic preferences of politically powerful agents or to other players (actors or brokers) with high political influence ;
- the more favorable the feasible strategy spaces of agents with regard to an actor are, i.e. if the agent are institutionally restricted to punish an actor in case of conflict.

The main research hypotheses presented earlier in this chapter are designed to explain the observed relationship between political communication structures and policy outcomes. Controlling for other determinants our theoretical framework suggests that there exists a positive correlation between political capital measured on the basis of communication structures and the final policy outcome in terms of organizations' budgetary success.

3 Testing the theory

3.1 Methodical outline

In order to test our theoretical model empirically, we re-analyze the data of Rivertown cutback decision making study (see Uusikylä 1993a)[13]. Since the empirical estimation of the complete game-theoretical model is problematic, partly because of the restrictive conditions of data collected and partly due to conditions that are not directly observable[14], the analysis is based on statistical testing of the two hypotheses formulated in section 2.5. To do so, we apply regression analysis to the Rivertown data explaining organization's received welfare from the policy outcome by its communication structures controlling for other relevant determinants. In section 3.2 we shall first describe the cutback decision-making process in Rivertown, introduce the relevant budgetary players (agents, actors and brokers) and their strategies as well as their payoff functions. Section 3.3 presents a more descriptive analysis of the political communication ties among the relevant players. In section 3.4 we shall present a political capital index for transforming actor-agent- respectively actor-broker-agent-communication structures into a consistent quantity index corresponding to our theoretical framework. Furthermore, we shall briefly discuss how far the established concepts of network analysis such as prominence and centrality, could be applied as an alternative measuring devices for political capital. Also, the actor-actor communication structure as an indicator for the trust building cost in coalitions and its role as a predictor of organization's welfare will be discussed in this section. Section 3.5 comprises the final empirical results.

3.2 The Rivertown study

Rivertown (pseudonym) is a mid-size city in southern Finland. Since in the beginning of the 1990s the economic conditions in most Finnish municipalities changed dramatically mostly due to growing unemployment rates and numerous bankruptcies, also Rivertown's tax base decreased rapidly in 1990 and 1991. Even if the political decision-makers in Rivertown were obliged to raise taxes and increase the short term borrowing this was, however, not enough to cover the rapidly growing expenditures. In 1991 the city budget office and government decided to launch a more profound retrenchment process in order to cut back the expenditures. This

---

[13] The Rivertown case study is part of the larger project that took place at the Department of Political Science of the University of Helsinki during 1991-92 focusing on the transformation of the Finnish welfare state.

[14] For further discussion of this topic see Henning (1994b), who also formulates an operational version of the model to analyse european agricultural policy.

policy alternative got more emphasis during the year 1992. The actual political cutback decisions were made according to the following two-stage process. The city council as an elected authoritative decision body could not find a compromise over appropriate cutback targets and therefore established a para-political crisis committee, called the economic advisory board (EAB) to work out the preliminary proposal for potential cutbacks of service sectors such as social & health care, fire, education, sport or housing sectors. On the basis of this proposal the council made the final decisions regarding the overall cutbacks of each department. On the second stage the political boards which are executive bodies established for each sector decided over concrete targets of these aggregated cutbacks within one of each sector. These program cuts where finally implemented by administrative organizations subordinated to the political board. The Rivertown study and our empirical analysis here focuses on program cuts actually implemented in the social & health sector (SHS). SHS is considered to be one of the most important sectors in Rivertown due to its size (50 % of the operating budget in Rivertown) and the service structure, that is producing highly valued welfare services to the citizens. In his Rivertown study report Uusikylä identified the following public and private organizations involved in the cutback decisions in the social & health sector (SHS in the following): (1) authoritative decision bodies (2) public service agencies, (3) private service agencies, (4) political parties, (5) labor unions, (6) voluntary organizations, (7) mass media agencies and (8) clients of each service agencies. Converting this into our game-theoretical framework, we can identify the following aggregated players: 1) agents, 2) actors and 3) brokers.

Agents

By agents we simply mean the actors operating in a specific sector with given decision-making authority. Because we consider the policy cycle as a whole (i.e. including also the implementation phase), also the administrative agencies at the sectoral and district level are included in this category. The political board (D1) is considered to be the most important agent (decision body). The board of social and health care is nominated by the city council and reflects the relative political strength of the city council. Sectoral central administration (D2) monitors the sectoral budget and coordinates the service production of the five independent service districts. It also controls directly some centralized service programs. District administration (D3) controls the budget of each geographically based service districts. It is also the decision body formally in charge for implementing the service programs within a district.

Overall, we separate 51 service programs in the SHS and interpret them as different issue dimensions α_h (h=1,...,51).

According to the expositions in section 2, all agents have payoff functions corresponding to eq. (10). As regards content, it seems reasonable to assume that the intrinsic political preferences of the political board members (D1) mainly correspond to interests in re-elections, while following Niskanen's theory of bureaucratic actors (Niskanen 1971) the intrinsic preferences of the administrative managers correspond more to their interest in high sectoral (D2) as well as districtional (D3) budgetary amounts. Furthermore, it seems reasonable that the individual favors (S) of D1-agents correspond mainly to political support, since the members of the board are analogous to the city government nominated by the city council and thus dependent on election outcomes. On the other hand it seems reasonable that administrative top managers are more interested in valuable information or social approval than political support, since they are neither elected and in principle nor politically nominated. Note that in this context we do not have to specify the payoff function of the agents for the empirical analysis presented in the paper. Thus, for our purpose it is sufficient to note that for all agents a payoff function exists which corresponds to eq. (10). According to section 2.4 we assume that each agent controls not only his politically preferred positions regarding the program cuts but also his resources (δ_G) to influence other agents.

Actors

According to the formal organizational service structure of Rivertown the following public service agencies are directly effected by program cuts in the SHS:

1. Health care centers and hospitals (a11 to a14)
2. Day care centers (a21 to a24)
3. Homes and institutions for the elderly (a31 to a32)
4. Institutions for the disabled (a41 to a44)
5. A-clinics and recreation centers for alcoholics (a51 to a54)
6. Foster homes (a61 to a62)
7. Working centers for the disabled (a7)
8. Family counseling centers (a81 to a82)

In addition to this the city of Rivertown has some contracts with private service providers operating mainly in the field of health care services and day care services. The first Rivertown cutback study included five most important private service agencies in the analysis (a91 to a95). Two of these were health care agencies, two private day care centers and one producing services for the elderly[15].

While it is straightforward that the private service agencies as profit maximizer try to influence the cutback decision in their favor, using their political resources (δ_I), we analogously claim applying again the well known theory of Niskanen (1971) that also the public service agencies like the private (economic) agencies are purposeful maximizers of their own utility. Since they are not able to maximize their profits, they attempt to maximize salaries, perquisites of the office and power of their agencies. This can most easily be done through expanding their budgets. Since the budget of each service agency public or private is affected to a different extent by different programs according to the subsector it operates in the final absolute payoff cut each agency observed is given by the following function:

$$\Delta U_I(\alpha) = \sum_h X_{Ih}\ \alpha_h \tag{14}$$

,where $0 < X_{Ih} < 1$ denotes the involvement of an agency I in a program h. Based on budgetary information from the Rivertown administration we are able to derive the involvement matrix X presented in appendix 1.

Note, that the involvement coefficients of all public agencies sum up to one, reflecting the fact that each public service agency is completely financed by state programs, while this is not the case for private agencies due to the fact that private agencies finance themselves also over the free market.

Brokers

The political battle over budgets is open to the environmental effects (Wildavsky 1988; Rubin 1993). External actors such as clients and interest groups can gain influence over budgets even if they are not directly involved in the budgetary decision-making on the formal arena. The involvement of the outside interests over budgets is likely to create coalitions between interest groups and public agencies. They both share common goals over the budget with the aim to expand

[15] The public and private service agencies were selected on basis of the series of the expert interviews carried out before the final interviews.

the service programs on the period of growth or to protect the existing programs on the period of decline. This results in the fact that public agencies give up their loyalty as obedient administrative units responsible only to implement policy decisions and more or less directly involve with the political priority setting process.

We identify the following external actors in the Rivertown cutback decision: 1) Voluntary organizations (B1), 2) labor unions (B3), 3) media agencies (B5) and 4) clients (B6). Because of the decentralized decision-making structure in which sectoral decision-making is clearly separated from the cross-sectoral level, we also consider the political parties (B4) as well as the mayor's office (B2) operating at the upper level as a potential brokerage channels to service agencies and interest groups trying to influence the sectoral decision bodies D1 to D3.

Since the public service agencies are embedded in a more or less hierarchical bureaucratic structure and both public and private agencies are organizations not at all concentrated on political bargaining, we argue that the service agencies have only limited possibilities of direct political influence over cutback decision. Therefore, indirect political influence over brokers plays an important role in the cutback battle among agencies. This strategy of attempting to gain indirect political control over a broker corresponds to the leverage-models introduced in the field of inter-organizational management (Gargiulo 1993, Burt 1992, Kotter 1985). Basic idea behind these leverage models is that ego observing his limited ability to constrain alter directly coopt a third party who has some control over alter. But, in contrast to the pure structural leverage-models our game-theoretical model explicitly provides a micro-theoretical explanation of this behavior allowing in principal quantitative predictions of both strategies direct and indirect political influence.

Another fact that implicates the importance of broker relations for realized cutbacks of agencies is the restricted possibility of favorable coalition building among agencies. Note that only agencies with a very similar program involvement structure have true incentives for collaboration[16].

Note further that as regards content the different brokers analogous to the agents can be influenced by agencies due to very different social relations. For example, it seems reasonable

[16] This corresponds to the communication structure among the actors, since only agencies operating in the same subsector communicate with each other (see section 3.3).

that political parties are interested in political support, while the labor unions mainly focus their interests on organizational support from their clients, the labor force. Contrary, influential efforts regarding brokers like clients, voluntary organizations or mass media seems to be more likely due to the demand for valuable information or even social approval of these players.

3.3 Political communication structures in Rivertown

To give the reader an overall impression of the structure of our network data we first present the descriptive statistics of the network and analyze the relations between the aggregated actor blocks discussed in the previous chapter.

Our data is based on the questionnaire in which one informant (usually the executive director, financial manager or the chairman) of each service agency, important voluntary organization, political party, media (journalists on local politics), administrative unit (such as department top management, district management etc.) and the labor unions were asked to name the representatives of other organizations in a given list, they had contacted in a purposeful manner to discuss the cutback targets important to them. This question resulted in a 125 x 125 adjacency matrix of the informal contacts between various actors involved in cutback decision-making. The contacts were valued from 1 to 3 according to the intensity of the communication in a dyadic relation[17].

Figure 1 represents the two-dimensional MDS-configuration of the overall communication structure of Rivertown cutback decision-making[18]. For the clarification all decision bodies as well as external brokers are aggregated into the functional groups corresponding to their organizational role. Service agencies are presented as individual actors. The non-metric solution is based on the dissimilarities (derived from path distances) between the actors. Before computing the path distances the original, valued, data matrix was symmetrized by using the minimum criteria (i.e. x_{ij} and x_{ji} were replaced by their minimum value) and then dichotomized by accepting all the contacts ≥ 1. The minimum criteria for symmetrizing the data was chosen in order to improve the reliability of the communication data. The Kruskal's stress-value of the solution is .072, which indicates a fairly good fit (Kruskal 1982, 61). One should, however,

[17] The core organizations in the SHS were identified on the basis of expert interviews carried out before the data collection.

[18] The non-metric MDS was done by Ucinet -program, which utilizes the MINISSA algorithm. After the procedure MDS coordinates were exported to the Krackplot graphics program and combined with the original binary data matrix.

keep in mind that the comparison of the network positions between aggregated actors is somewhat problematic due to the differences between the number of actors belonging to different blocks. Nevertheless, we feel that even a very superficial description of the network structure is extremely helpful for understanding the further findings of the impact of communication on political decisions.

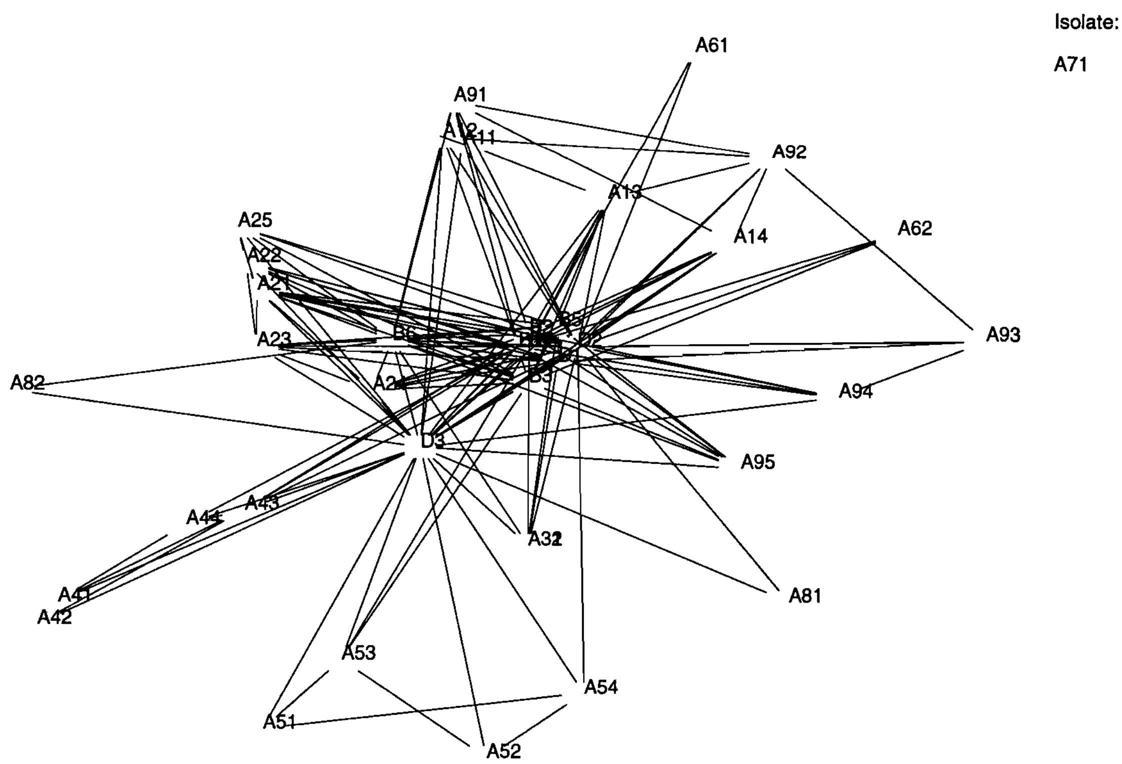

Figure 1. The communication network of Rivertown cutback policies

Figure 1 indicates a relatively centralized communication structure around the Rivertown cutback decision making. This network has two main centers: one concentrating on two of the most important decision bodies (D1) and (D2) and the other formed around the district administration (D3)[19]. Looking closer at the structure of the network, it can be noticed that two of the sectoral decision bodies (D1 and D2) are surrounded mainly by the external brokers

[19] Freeman's network centralization index = 65.31 %. The centralization index characterizes an entire network and should not be confused with point centrality. Graph centralization measures the degree to which the centrality of the most central point exceeds the centrality of all other points. Thus, it is „expressed as a ratio of that excess to its maximum possible value for a graph containing the observed number of points" (Freeman 1979, p. 227).

(B1 to B6) that have a position where they can act as intermediary organizations between the service agencies and decision bodies, even if many agencies have also a direct access to the sectoral top-bureaucrats. The role of the top-bureaucrats in the decision process is to propose cutback plans to the political body D1. Contrary to D1 and D2, the third decision body, district management (D3) is located outside of the previous core, and has connections mainly to the individual service agencies, and in addition to this has only very few ties to the external brokers. All the decision bodies are interconnected via communication ties. There is one isolate point in the nework. The the working center for the disabled has no communication links whatsoever to other organizations. The centralized structure of the communication suggests that there is relatively little horizontal communication ties between single service agencies. Nevertheless, it can be observed from the figure that those existing horizontal ties connect mainly organizations belonging to the same functional service category. Table 1 shows that the intra-block densities[20] among service agencies are the highest in the block of institutions for disabled (.63), in the health care block (.50) and among A-clinics (.50).

[20] Density indicates the volume of ties in a network or a subgroup of network and is defined as the observed number of ties as a percentage of the maximum number of ties possible for a network of size n. The maximum numbers of possible ties is n^2-n, where n is the number of nodes in the network.

Table 1. The centrality indices of the Rivertown communication network

	Degree				*Closeness*				*Betweennes*				*Density*
	avg	min	max	std	avg	min	max	std	avg	min	max	std	avg
D1	57.72	-	-	-	41.41	-	-	-	7.76	-	-	-	-
D2	41.73	28.46	55.28	10.95	38.48	36.50	40.73	1.74	5.99	2.25	10.75	3.54	0.67
D3	21.87	13.01	47.97	11.30	35.21	33.7	39.55	1.78	1.75	0.07	9.24	2.76	0.64
A1	8.94	5.69	1707	3.78	31.97	30.45	33.98	1.10	1.60	0.11	5.34	2.01	0.50
A2	9.76	4.07	13.01	3.16	33.15	31.70	34.07	0.86	0.92	0.00	2.97	1.09	0.33
A3	10.03	8.13	11.38	1.38	33.24	32.89	33.42	0.25	0.68	0.01	1.16	0.49	0.22
A4	5.29	2.44	11.38	3.57	29.86	28.74	32.80	1.70	1.08	0	3.93	1.68	0.63
A5	4.68	2.44	8.13	2.40	29.50	26.28	31.87	2.11	0.09	0	0.29	0.12	0.50
A6	2.85	2.44	3.25	0.41	29.89	29.71	30.07	0.18	1.20	0.01	2.39	1.19	0.00
A7	0	-	-	-	0	-	-	-	0	-	-	-	-
A8	3.25	3.25	3.25	0	31.22	30.90	31.54	0.32	0.05	0.01	0.09	0.04	0
B1	5.68	1.63	12.20	2.82	30.74	24.21	33.98	2.21	0.03	0	1.2	0.20	0.05
B2	11.92	3.25	26.02	6.70	33.13	30.30	35.76	1.68	0.10	0	0.66	0.20	0.13
B3	13.61	8.13	21.95	4.87	33.48	30.07	35.34	1.59	0.14	0	0.59	0.20	0.56
B4	7.83	0.81	19.51	6.50	30.74	25.95	34.75	3.30	0.17	0	0.85	0.27	0.22
B5	13.28	6.50	17.89	4.90	32.05	28.28	33.98	2.66	0.04	0	0.10	0.05	0
B6	29.27	-	-.	-	36.07	-	-	-	10.78	-	-	-	-

One of the primary uses of network analysis in the field of policy studies is the identification of the most prominent actors in a policy process and examination of their role in relation to policy outcomes. The actor, in general, is considered to be prominent if the ties of the actor make it particularly visible to other actors in the network. This is also the assumption behind most of the empirical measurements of centrality in social networks. Organizations' centrality according to different centrality measures in Rivertown is presented in table 1. Centrality scores are computed from the original data matrix. For the reasons of clarification, we have used a dichotomized binary matrix applying the same cut-off criteria as above. In order to see the variation of existing communication ties within the aggregated block, we also present the minimum, maximum values and standard deviations of the blocks.

The simplest definition of actor centrality is that central actors must have most of the ties to other actors in the network (Wasserman/ Faust 1994, 166). By this definition prominence is simply a degree of direct ties between actors. Degree is defined by Freeman (1979, 22) as the number of direct contacts for point p_k.

$$C_D(p_k) = \sum_{i=1}^{n} a(p_i, p_k) \tag{15}$$

This also corresponds to Burt's (1982) early definition of the ego-density of a non-directional relation, which is simply the ratio of the degree of an actor to the maximum number of ties that could occur. This measurement can easily be applied also with the analysis of the valued relations and can be normalized when comparing networks of different sizes. We use here the normalized centrality index[21]. According to table 1 the political decision body (D1) seems to be the most central organization in the network. Also the administrative agents (D2 and D3) get very high centrality scores. Health care units (A1) as well as day care centers (A2) and institutions for the elderly (A3) seem to be the most central service agency blocks. Clients receive the highest degree centrality among the brokers. The obvious shortage of the application of the centrality degree is that it considers only the direct contacts between actors. Theoretically this is problematic, since indirect links between actors often tend to be extremely important, not only for providing valuable information to an actor (Granovetter 1973), but also for actor's general visibility often used as an indicator of the prominence (Knoke/ Burt 1983). One way of taking indirect ties into account as well is to measure the actor's closeness or distance from other actors. The simplest way of doing this is to measure it as a function of geodesic distances, i.e. to measure the extent to which a point is connected by short paths to other points.

$$C_C(p_k) = \left[\sum_{i=1}^{n} d(p_i, p_k) \right]^{-1} \tag{16}$$

As one can see from formula (16) the index of closeness is simply the inverse of the sum of distances (farness) from i to all other actors. Actors occupying central positions in terms of closeness can be very productive in providing information to other actors (Beauchamp 1965). The closeness index in table 1 is a normalized closeness centrality score, which is the reciprocal

[21] We use the symmetrized data matrix because the differences of the indegrees and outdegrees were extremely low. This suggests that most of the communication ties between aggregated actors are reciprocal, i.e. the reported contacts have also been confirmed. This, of course, is only true when looking whether a tie exists or not. Differences are somewhat bigger in terms of the intensity of the contacts.

of farness divided by the minimum possible farness expressed as a percentage. The differences in closeness centrality in our case are extremely low. This indicates that all of the actors (exept the isolate A71) may be reached by others and in most of the cases the distance is not further than 2 or 3 paths. If the focus is shifted from the communication efficiency to the strategic aspects, one can argue that the most central is the actor that controls most communication between other actors. The betweennes centrality is based on the assumption that an actor is central if it lies between other actors on their geodesics and therefore must be between many of the actors via their geodesics.

$$C_B(p_k) = \sum_{i<}^{n} \sum_{j}^{n} bij(p_k)$$

where (17)

$$b_{ij}(pk) = \frac{1}{g_{ij}} x g_{ij}(p_k)$$

and $g_{ij}(p_k)$ = the number of geodesics linking p_i and p_j that contain p_k. In table 1 we can observe that the client-block (B6) receives the highest betweennes score. One could interpret this as an indicator of the high brokerage position of the clients, but since clients in this case seem mainly to bridge functionally segregated service units together we are more willing to reject this interpretation. Another interesting phenomenon is that D1 and D2 have relatively high betweenness centrality indices (7.76 and 5.99) , but D3 only 1.75. The low betweennes centrality score of D3 is mainly due to a large variation within a group. According to the definition of the betweennes centrality it is assumed that lines between nodes have equal weight, and that communication will always travel along the shortest route regardless of the individual actors along the route (Wasserman/ Faust 1994, 178). Because of these rather unrealistic assumptions, betweennes centrality has often been replaced by the information centrality measurement, which relies on the estimation of the information that flows between actors in networks (Stephenson/ Zelen 1989). We shall discuss more the importance of the weights of the ties in the next chapter. We argue, that in order to capture a substantively meaningful prominence measurement of institutionally secluded actors in policy networks two important conditions have to be met: first the applied prominence index ought to be based on consistent theory of political decision-making and secondly each inter-organizational relation in a given political subsystem has to be valued not only according to its intensity but also according to the efficiency it has for a political actor to achieve important policy goals. We introduce an alternative mode of transforming a content specific communication network properties into a political capital index, which has consistent game-theoretical interpretation and provides a solution to the problem of aggregation of heterogeneous units by estimating the efficiency weights for each contact. Finally, we examine the effect of different indices of centrality and prominence on the policy outcome, that is final cutback of the budget of an organization.

3.4 Transforming communication structures into political capital

Political capital refers to the favorable position an actor occupies in political communication network. Since political capital, considered as particular type of social capital, is an abstract and unobservable construct its empirical measurement is a rather complicated task. Even the literature on social capital offers very little suggestions for the empirical measurement of the concept (see Gabbay 1994). Applying the concept we mainly refer to Coleman (1990) who provides a measurement of social capital corresponding to the power derived from his linear system of action. Furthermore, Burt (1992) suggests several calibration methods, (e.g. effective network size, efficiency or constraint of social capital) based on ego-centered networks. While Coleman's treatment of social capital focuses more on social structures commonly created and used by a group of actors (in community or society) like norms or voluntary organizations with a rather collective good character, Burt analyses the impact of social structures as individually possessed social capital on actors' success in competition. According to our derived game-theoretical framework we understand analogously to Burt political capital as an individual resource corresponding to a given social structure. But, as will be shown we have developed a somewhat different method to transform given network structures into actor specific political capital indices.

Generally, a given social structure, like a communication network, can have a very different value to an actor in the sense that it facilitates different types of actions to a different extent (see Coleman 1990, 300). For example a pivotal position in a political information network might be very productive in exercising political influence, but the very same position and network is likely to offer only little help if one is operating in a network marketing business trying to maximize the sales profits or if one is searching new recipes for baking a cake. Thus, the amount of social capital corresponding to a given network structure is generally dependent on the envisaged target this structure is aimed at. For the same reasons it can generally not be excluded that relations to different nodes, (e.g. organizations or persons), have a different value to an actor according to a particular goal he is trying to achieve (objective function). Thus, the attempt to transform networks of social relations into a consistent social capital index is complicated due to an aggregation problem, since the relations to different organizations are generally not comparable regarding their efficiency to achieve a given goal actors compete for. For example, measuring the amount of quasi-fix capital corresponding to a given customer network of a sales man competing with other sales men in a common market, one can not only focus on the relative ties each sales man has to the customers. It is also important to consider the economic potential of each customer reachable to the sales man. Thus, a connection to the customer with low purchasing power results in a lower amount of social capital measured in standardized units than a channel of the same size to a customer with high purchasing power. To be clear, especially in a competitive framework the concept of social capital is a useful tool of analyses only if it is comparable among actors. This in return requires the existence of standardized unit of measurement and thus a solution of the aggregation problem stated above.

Burt (1992, 4), for example, seems to take an extreme structuralist position in this context by explicitly arguing that the nodes of a network are neglectable and only the structural relation intersecting in the node counts for the explanation of competitive outcomes. Of course, this holds true if all the nodes can be taken as homogeneous units regarding their effectiveness to reach the competitive target in concern. In this very special case there is no aggregation problem and the measurement suggested by Burt produces consistent social capital indices.

As a preliminary starting point we follow Burt by assuming that all the nodes are homogeneous, that is all agent and broker contacts have an equivalent role according to their effectiveness to produce political influence. In this restricted framework our game-theoretical framework implies the following political capital index:

$$K_i = \sum_{g \in G} \left(Z_{gi} + \sum_{g' \in G} Z_{g'i} Z_{gg'} + \sum_{b \in B} Z_{bi} Z_{gb} \right) \qquad (18)$$

where: $Z_{ij} = \dfrac{z_{ij}}{\sum_{k \in N} z_{ik}} \quad \forall i \in N$

In eq. (18) Z_{ij} denotes the relative size of the communication channels (z_{ij}) established between player i and j compared to the sum of communication channels established between player i and all other players k (z_{ik}). As regards content, the quantity index defined by eq. (18) implies that the amount of social capital possessed by an agency (actor) i is the higher the bigger the amount of direct and indirect communication channels to political agents.

Note, that this political capital index of an actor i corresponds to Burt's concept of actor-specific constraint. Neglecting the actor-actor communication, the expression in eq.(18) can also be written as:

$$K_i = \sum_{g \in G} \sqrt{D_{gi}}$$

$$\text{with:} \quad D_{gi} = \left(Z_{gi} + \sum_{q \in N} Z_{qi} \, Z_{gq} \right)^2 \tag{19}$$

As the communication matrix is symmetric, D_{gi} equals Burt's definition of contact-specific constraint (Burt, 1992, 54),and thus D_{gi} is the constraint of an agent g derived from the contact to actor i. Adopting Burt's interpretation political capital can be seen as the ability of an actor to constraint political agents. Note, that contrary to Burt's contact-specific constraint the political capital index in eq.(16) is also defined if an actor i has no direct contact to an agent g, e.g. if $z_{gi} = z_{ig} = 0$.

But, given the exposition in section 2 and 3 it is apparent that all contacts cannot be taken as equivalent. For example, a direct contact to a powerful agent results c.p. in a higher amount of social capital than a channel of the same size to a less powerful agent. Analogously a direct channel to an efficient broker results c.p. in a higher amount of social capital than the channel of the same size to a less effective broker. Thus, adding these channels together means adding apples and pears. Theoretically, these heterogeneous channels might be comparable by transforming them into standardized efficiency units corresponding to a fixed degree of target achievements, that in turn can be interpreted as the value of one unit of social capital. Thus, generally heterogeneous relations can be aggregated to one consistent social capital index by weighting each tie with its relative value corresponding to the target achievement. This can be done by using one unit of this relation as an indicator of the weight. It should, however, be noticed that this method only allows a comparison of individual social capital indices among different actors if the values used as aggregation weights are equal for each actor. This in return requires that the objective function of each agent is comparable, which is very seldom the case, since the utility functions are individually based. If the defined social capital units depend on the individual utility functions they are, once again, not comparable between different actors. How can this dilemma be resolved?

In economics the problem of aggregating heterogeneous units, like assorted production factors, is resolved by using their relative market prices as transformation weights. Note, that in principal this method corresponds to the method suggested above, since the relative market prices, assuming the existence of perfect markets, exactly equals their marginal profit and thus their marginal contribution to target achievement.

To apply the same aggregation rule in our case, suppose there exists a perfect market in which information channels to different agents and brokers are exchangeable. Under this condition, one can derive equilibrium prices for each channel, which corresponds to the marginal target achievement any actor can additionally realize given him one more unit of the channel. Thus, these equilibrium prices can be used for a consistent aggregation of political capital[22]. Assuming that V_g respectively V_b are the equilibrium prices for a contact channel to agent g and broker b, it results in the amount of political capital possessed by an actor i:

$$K_i = \sum_{g \in G} V_g Z_{gi} + \sum_{b \in B} Z_{bi} V_b \tag{20}$$

Unfortunately, it is impossible in our game-theoretical framework to derive equilibrium prices for different agent and broker channels. But, nevertheless one can identify certain properties of different agents and brokers that correlate to these relative values of different communication channels. Note, that we use collectively determined relative values to aggregate heterogeneous channels into an index, which corresponds to the amount and not to the individual value of social capital possessed by different actors. The difference is that a collective evaluation of a channel reflects only the properties of this particular channel that are commonly given for all actors. Thus, subjective criteria like individual preferences or the efficiency of individual

[22] Note that Coleman (1990, 313 and 815) implicitly uses this method of aggregation measuring social capital by the power derived from his linear system of action, which just assumes a perfect exchange market.

political power functions of actors are no determinants of these relative values. But, the efficiency of political power functions of different brokers or political agents as well as the institutional power of an agent are commonly given to all actors and therefore determine the relative prices of different relations. We assume that the higher the institutional power of an agent the higher c.p. would be the price of a relation to him. Furthermore, the technical efficiency of the agent's respectively the broker's political power functions is positively correlated to the relative value of a channel to these players. On the other hand, the relative prices also reflect the preferences of an agent respectively a broker for favors provided by actors. For example, a fairly strong communication channel to a technically efficient broker has a relatively small importance if this particular broker has low preferences for the favors produced by the actors[23]. Thus, overall the price (relative value) of a contact channel to an agent g depends c.p. a) on g's institutional power and b) on g's contact channels to other powerful agents. Analogously the price of a contact channel to a broker b depends c.p. on b's contacts to other powerful agents.

Furthermore, according to Pappi and König (1993; 1995) it seems reasonable to distinguish between indegrees of agents as governmental organizations and indegrees of brokers respectively actors as non-governmental organizations. In our case, it seems quite plausible to assume that an agent as a governmental organization generally supply other types of favors than brokers or actors do. For example, the political support provided by an agent to another agent might more correspond to the political career of the agent, while the support provided by non-governmental organizations is in general more related to the re-election of the political agent. Therefore it seems reasonable to argue that a contact channel of a given relative size is more favorable to the player (agent, actor or broker) if there exist only few other channels to players of his type which make him less substitutionable. Formally, this can be incorporated by defining the relative size of a communication channel according to the sum of all existing channels to players of the same type.

Note, that in contrast to the prices the indicators discussed here are generally observable. Approximating the unobservable prices by their observable indicators delivers the following:

[23] Furthermore, one can imagine that a broker or an agent generally has a high interest in the favor, but is exogenously provided by a relatively high amount of this favor. Consider, for example, a political agent which has due to his carisma a high amount of political support, so that although he might be very interested in political support, he is actually not very much interested in political support additionally provided by the actors.

$$V_g^* = C_g + \sum_{g' \in G} Z_{gg'}^* C_{g'}$$

$$V_b^* = \sum_{g \in G} Z_{bg}^* C_g$$

where: (21)

$$Z_{gj}^* = \frac{z_{gj}}{\sum_{g' \in G} z_{g'j}} \quad \forall g \in G\, \forall j \in N$$

$$Z_{ij}^* = \frac{z_{ij}}{\sum_{k \in I \cup B} z_{kj}} \quad \forall i \in I \cup B\, \forall j \in N$$

To get to an operational measurement of political capital one can substitute the unobservable prices V by their observable approximations V* in eq. (21). But note that generally the approximations V* will divergent from the real prices V, due to different preferences and political power functions of the agents and the brokers. Formally, one can capture this aspect by introducing the efficiency weights for each contact (w), which incorporates these generally also unobservable differences, where it holds:

$$V_k = V_k^* \, w_k \quad \forall k = b, g \tag{22}$$

As will be seen in the next chapter these weights can be taken as endogenous variables and, estimated empirically, given a sufficient data bases[24]. Note that the final policy index still corresponds to our starting point eq.(18), to see this substitute eq. (21) and (22) into eq.(20), delivers:

$$K_i^* = \sum_{g \in G} w_g Z_{gi}^* \left(C_g + \sum_{g' \in G} Z_{g'g}^* C_{g'} \right) + \sum_{b \in B} w_b Z_{bi}^* \sum_{g \in G} Z_{gb}^* C_g \tag{23}$$

Some rearrangements of eq. (23) finally leads to:

$$K_i^* = \sum_{g \in G} \left(Z_{ig}^* w_g + \sum_{g' \in G} Z_{g'i}^* Z_{gg'}^* w_g + \sum_{b \in B} Z_{bi}^* Z_{gb}^* w_b \right) C_g \tag{24}$$

[24] An alternative way to measure political capital indices is to approximate the relative prices in eq. (19) by corresponding reputation indices for each agent respectively broker, which could be derived from appropriate interview data. Since we do not have this data, we will not go into further details of this alternative.

4 Empirical results

4.1 Hypotheses

According to the expositions above the following hypotheses regarding the impact of communication networks on the final budget cutbacks can be stated:

1. *We expect c.p. a negative relation between the amount of political capital and the observed cutback of an agency, since the higher the amount of political capital of an agency the more efficient are c.p. its political power functions and thus the less it will be cut according to the game-theoretical equilibrium.*

2. *We expect c.p. a negative relation between the communication density of the subsector an agency operates in and the observed cutback of the agency, since the higher the density the lower c.p. the trust-building cost among these agencies and thus the lower the cutbacks in this subsector according to the game-theoretical equilibrium.*

Since, we are particularly interested in empirically testing the strength of the implication derived from our game-theoretical framework, we additionally test as a naive reference hypothesis to 1 and 2 to what extent the budgetary cutbacks can be explained by the established centrality measurements discussed in chapter 3.3. In detail we test Freeman's centrality, Bonacich power index and Burt's constraint index.

4.2 Statistical models, estimation procedure and empirical data

Regression analysis

To test our first hypothesis, we start with an estimation of the following nonlinear regression equation using the maximum-likelihood estimator of TSP:

$$\begin{aligned} &\Delta Y_i = \alpha_o + \alpha_H D_{Hi} + \alpha_M D_{Mi} + \beta P_i + \beta_H (P_i \cdot D_{Hi}) + \beta_M (P_i \cdot D_{Mi}) + \varepsilon_i \\ &P_i = \sum_Q \gamma_Q^2 \sum_{j \in Q} Z_{ij}^* \left(C_j + \sum_{k \in G} Z_{kj}^* C_k \right) \quad Q = D1, D2, D3, B1, B2, B3, B4, B5, B6 \end{aligned} \tag{25}$$

where the disturbances ε_i complying the following conditions:

$E(\varepsilon_i) = 0$; $E(\varepsilon_i,\varepsilon_j) = \Delta_{ij}\,\Omega_{ij}$ $\quad \Delta_{ij} = 0\ \forall i\neq j$, $\Delta_{ij} = 1\ \forall i=j$

with: $(i,j) \in IxI$, I is the set of all 28 agencies and Ω_{ij} is the covariance-variance matrix of the disturbances ε_i.

In eq.(23) $Y_i = \frac{\Delta U_i}{U_i}$ denotes the relative cutback of an agency i, where ΔU_i is the amount of implemented cutbacks (see eq. (14)) and U_i equals the budget of an agency before the cutbacks. P_i simply equals the political capital index as defined in eq. (23), where C_j denotes the institutional control of player j. According to the original report of Rivertown cutback policies we set:

$$C_j = \begin{cases} 1 & \text{if } j \in D1 \\ 0{,}1 & \text{if } j \in D2 \\ 0{,}01 & \text{if } j \in D3 \\ 0 & \text{otherwise} \end{cases} \qquad (26)$$

Note, that the parameters $[\gamma_Q^2]$ in eq.(25) can be interpreted as an empirical estimation of the unobservable efficiency weights w_g, w_b introduced in section 3.4. Since we have only 28 observations (number of service agencies), we have to save degrees of freedom. Therefore we assume generally that all agents respectively brokers belonging to the same port-type Q, (e.g. are members of the board (D1), a voluntary organization (B1) etc.) have the same efficiency weight. Furthermore, this grouping of functionally equivalent agents respectively brokers facilitates the interpretation of the estimation. We apply the squared parameters to prevent the efficiency weights of being negative for some broker and agent type Q. The subindices for each port-type Q were calculated from the empirical communication network data of the Rivertown study. The original communication network is a directional valued matrix with entries ranged from 1 to 3, where 1 stands for low, 2 for moderate and 3 for high communication intensity as mentioned in section 3.3. To calculate the subindices applied to estimate eq. (25) we followed Pappi and König (1993; 1995) and used only the communication intensity confirmed by the receiver, (that is we use only the communication channels that are confirmed by the corresponding target ports, agents or brokers). This provides a more reliable information of the real communication flows.

D_H and D_M are Dummy variables introduced to control for the other determinants of the policy outcomes. According to the game-theoretical model there are also many other important components determining the final policy outcome than the political capital. Thus, we do not expect a general significant impact of political capital without controlling at least for major other exogenous components. In his original report of Rivertown cutback decision-making Uusikylä identified four types of institutional factors that contribute to the ability of an organization to avert cutbacks: legislative protection, composition of the budget, visibility and diversity of the services and the level of expertise in an organization (see also Beck-Jorgensen 1987). We apply here mainly the legislative protection as an institutional factor protecting organizations, since due to binding legislation there is only very limited possibility to cut certain service programs. We furthermore identify the general popularity of various programs as an further exogenous determinant, because the year of 1992 (the year of the implementation of these cutbacks) was an election year and the cutbacks were one of the major election topics. Since there are some agencies, like kindergartens or hospitals providing essential services to a broader group of middle class voters compared to agencies like A-clinics and workshops providing special services to a marginal group, it could be assumed that the former ones are better protected due to the intrinsic political interest of agents, even if they do not utilize their political contacts.

On the basis of these institutional restrictions and different general political popularity of programs cuts, we define three protection clusters separating high-, medium- and low-protected agencies. To be more specific, we consider all agencies operating in the subsector of health care, school and children care as highly protected, all agencies operating in the alcoholics and disabled subsector as low protected and all other agencies as medium protected. As a special case we consider the five private agencies. They operate in high-protected subsectors, but since they are private and we argue that it is much easier to legitimate cutbacks on private rather than on public agencies, we consider the five private agencies only as mid-protected. In eq. (25) the dummy variables D_H respectively D_M correspond to the high respectively mid-protected clusters.

Eq.(25) is non-linear in parameters and the estimation of non-linear regression equations is often problematic, particularly it is often impossible to get consistent estimations. This also appears to be the case in our study. Thus, to handle these technical estimation problems, we apply the following two-stage estimation procedure. On the first stage we estimate the general form of equation (25) which allows different intercepts $[\alpha_0+\alpha_H D_H+\alpha_M D_M]$ for each protection cluster and different slope parameter $[\beta_0+\beta_H D_H+\beta_M D_M]$ of the political capital index.

Since these estimations are not reliable due to technical estimation problems according to the non-linearity of the model, we set the interaction effect of the slope for the mid-protected cluster to zero and separate the general model into the following two submodels which we connect over loops:

$$\begin{aligned}
&(1)\quad \Delta Y_i = K_i + (b_{1i} + b_{2i}) \sum_{Q} \gamma_Q^2 \sum_{j \in Q} \left(Z_{ji}\, C_j + \sum_{k \in G \cup B} Z_{kj}\, C_k \right) \cdot + \varepsilon_{1i} \\
&\text{with:}\quad K_i = \hat{\alpha}_o + \hat{\alpha}_H\, D_{Hi} + \hat{\alpha}_M\, D_{Mi} \text{ and } (b_{1i} + b_{2i}) = \hat{\beta}_0 + \hat{\beta}_H \cdot D_{Hi} \\
&(2)\quad \Delta Y_i = \alpha_0 + \alpha_H\, D_{Hi} + \alpha_M\, D_{Mi} + \beta_0\, \hat{P}_i + \beta_H \cdot D_{Hi}\, \hat{P} + \varepsilon_{2i} \\
&\text{with:}\quad \hat{P}_i = \sum_{Q} \hat{\gamma}_Q^2 \sum_{j \in Q} \left(Z_{ji}\, C_j + \sum_{k \in G \cup B} Z_{kj}\, C_k \right)
\end{aligned} \tag{27}$$

in eq. (27) the overhead „ ^ “ denotes the estimated parameters, which are taken as constants in the actual equation they appear. As the very first starting values of $\hat{\alpha}_0, \hat{\alpha}_H, \hat{\alpha}_M, \hat{\beta}_0, \hat{\beta}_H$ in the first submodel of eq. (25) we use the corresponding estimations received on the first stage, while in any further loops we use the estimations received from the previous submodel. The loops continue until the parameter estimation of both models corresponds sufficiently with each other.

Additionally, corresponding to the formulated reference hypothesis we estimate linear regression equations of the following type:

$$\Delta U_i = \alpha_0 + \alpha_H\, D_{Hi} + \alpha_M\, D_{Mi} + \beta_0\, X_i + \beta_H \cdot D_{Hi}\, X_i + \mu_i \tag{28}$$

In eq. (26) X_i denotes the applied centrality measurements of agency i discussed in chapter 3.3..

Variance analysis

To test our second hypothesis, we apply a two-factorial variance model. Analogously to the regression analysis the endogenous variable of the variance analysis is the observed relative cutback

Y_i of an agency. Ks stands for a dummy variable defined on the basis of the average communication density in each of the 8 subsectors: health care, child care,....., (see chapter 3.3.). Ks is coded as 1 respectively 0, if this density is greater or equal respectively lower than the average density over all subsectors .

4.3 Estimation results

Table 2 shows that the goodness of fit of the estimation of the regression model eq.(27) can be considered as more than sufficient with an adjusted R^2 of 0.70. Also the standard regression error remains lower than 0.03. However, according to our hypothesis 1 the overall fitness of the model is not our main concern but rather the question whether political capital has an empirically significant impact on the implemented cutback each single agency observed. As a first step to answer this question we can analyze the t-statistics of the slope parameters β_O and β_H. According to table 2 β_O is significant on a 95%-level, while β_H is significant only on a 90%-level. In contrast to our theoretically derived political capital index, we observe no significant slope parameters for the alternative indices (see table 3 in Appendix 2).

Table 2. The results of the empirical estimation

	Id1	Id2	Id3	Ib1	Ib2	Ib3	Ib4	Ib5	Ib6	Constant	DH	DM	PC	PC x DH	Adj. R^2 (std.err.)	ϕ[1]
Sub-model 1															.70 (.0293)	6.40130
Estimated parameters:[2]																
γ	1.3132 (.0687)	0.9993 (.7606)	1.0002 (3.2623)	2.0019 (.2078)	5.0076 (1.1017)	0.2787 (.4815)	1.6045 (.0888)	7.0116 (.2797)	0.2393 (.6142)							
Constant set																
α_0										.151828						
α_H											-.135948					
α_M												-.114042				
β_0													-.843441			
β_H														.890299		
Sub-model 2																
Constant-*set*:																
γ	1.313	0.999	1.0002	2.0019	5.0076	0.2787	1.6045	7.0116	0.2393							
Estimated parameters:[2]																
α_0										.151823 (9.8715)						6.40130
α_H											-.135953 (-5.3044)					
α_M												-.114040 (-6.7366)				
β_0													-.843091 (-2.4237)			
β_H														.890065 (2.0613)		

1) ϕ is a chi-square distributed likelihood ratio test for hypothesis $\beta_0 = \beta_H = 0$, with two degrees of freedom (equals the number of parameter constraints).
2) T-values of the estimated weights are in parentheses

But it should be noticed in this context that the t-statistics of single slope parameters of the different indices are neither sufficient or necessary conditions for a significant impact of these indices and thus for an empirical confirmation of our hypothesis 1. A significant impact of these indices can only be tested by setting simultaneously all slope parameters of the indices to zero. A possible test of this zero-hypothesis, by comparing the original model with a reference model that only includes the constant (α_0) as well as the dummy variables D_H and D_M, is the likelihood ratio test reported in table 2. According to the calculated likelihood ratio statistics, which are distributed asymptotically as a chi-squared variable with degrees of freedom equal to the number of parameter constraints (two in our case) (see Hall 1983), we observe a significant (at significance level of 95%) impact of our political capital index (see table 2). The impact of all other ad-hoc indices (Freeman's centrality and Bonacich power) are not at all significant according to the applied likelihood ratio test (see table 3 in Appendix 2). Therefore, we can conclude that these results c.p. support hypothesis 1. But to be consistent, we claim in hypothesis 1 not only that the derived policy index as a significant impact on implemented cutback, but furthermore that this impact is negative, which additionally implies negative slope parameters.

According to table 2 we observe a negative and significant sign for β_0. Given the exposition above, this implies that political capital has a significant (on the 95% level) negative impact on the implemented cutbacks for all low and medium protected agencies. This seems to support our first hypothesis. But, since the sum $\beta_0+\beta_H$ is positive this seems not to be the case in the cluster of the high-protected agencies. One should, however, be very careful not to over emphasize this finding since first of all this slope parameter ($\beta_0+\beta_H$) is not significant (on a 95% level) and secondly the sum is very close to zero. This means that the maximal estimated cutback difference caused by political capital in the high-protected cluster is lower than 0.55 per cent given an average cutback of 15 per cent. Thus, the overall results seem to support hypothesis 1, although in the subgroup of high-protected agencies political capital seems not to be such an important tool for reducing budgetary cutbacks. One should also observe that since the cutbacks of high-protected agencies are mainly determined by institutional restrictions and exogenously anticipated political support, there is really not much room for political bargaining among these agencies. Note further, that the estimation of the slope parameter suggest only a minor impact of political capital on cutbacks, since also β_0 is relatively small. The average amount of political capital results in a cutback reduction of only 3.15 % which is not much, compared to the average overall cutback of 15 %. This finding is rather satisfactory, since there are many other exogenous determinants like the legislative and institutional framework which are much more important limiting the space for political bargaining, where political capital is included. We did not, however, find support to our second hypothesis, according to which a higher block density results in lower cutbacks. Table 4 (in Appendix 2) illustrates the results obtained from the analysis of variance. Even if the dummy and the density variables are significant the effect seems to work the other way around: the agencies in the high-density blocks (especially in the low- and mid-protected categories) seem to receive the higher cutbacks. This is probably due to the emphasis on the implementation process. Agencies that were cut the most try to resist the implementation of the cutbacks in a more collective behavioral mode.

Even if our empirical results support our first hypothesis and prove that our index of political capital is superior to other measures of actor prominence in this case, we should emphasize that a flaw in the straightforwardness of our conclusion is caused by an unavoidable drawback of our general methodical approach. Since we do not have sufficient empirical data regarding the efficiency weights of contact channels to the different agents respectively brokers, we have to estimate them. But the estimation according to eq. (25) respectively submodel 1 in eq. (27) is done under the restriction to optimize the empirical fit of the political policy index based on our theory as developed in section 3.4. Thus, the estimation results of submodel 2, based on the estimation results of the efficiency weights derived from submodel 1, tend to increase the probability of a significant impact of the political capital index and therefore are no more an unbiased instrument to test hypothesis 1. If we would have estimated or observed these efficiency weights exogenously from our theoretical framework, our conclusion stated above would undoubtedly be true. Furthermore, a comparison of these estimated efficiency weights with empirically observed weights provides a sufficient basis to test our theoretical model empirically. Thus, to confirm at least our conclusion we do both: we first examine whether the estimation of the efficiency weights is at least empirically reasonable in the political arena of Rivertown. Furthermore, we show that the impact of the political capital index in submodel 2 of eq. (27) remains significant for a wider range of efficiency weights.

According to table 5 the media agencies (B5) and the mayor's office (B2) have the highest relative weights with 49.16 respectively 25.08. The next important broker channels are the voluntary organizations (B1) with 4.01 and the political parties with the weight of 2.58, whereas the labor unions (0.08) and the clients (0.06) seem to be rather unimportant brokers even if their centrality is fairly high. We also receive relatively low weights of 1.74 for the political board (D1) and 1.18 for the (D2) top-bureaucrats. Since the weight for the regional top bureaucrats is the only significant weight we use this as a fix point setting it to 1.

To evaluate to which extent these estimated weights correspond to the observations on the political arena of Rivertown, one has to consider the determinants of these weights. According to section 3.4 the agents' weights are determined by the relative institutional power, the technical efficiency of the power functions and the relative preferences for favors provided by the agencies. Thus, the higher relative weight of the political board compared to the other political agents can be explained by its higher political power. Furthermore, the extremely high weight of the media organizations seems reasonable, since the cutback decisions received much public attention and were decided after a long and conflictual political debate. During this process mass media generally plays an important rule. To apply this very same argument, it seems clear that political parties have a relatively higher weight compared to the political agents. What is surprising and partly unexpected, is the low weight for the labor unions, since these organizations are generally considered to be relatively strong and efficient organization, also at the local level. This can be explained by the preferences of labor organizations. Although, labor unions are considered to be efficient bargaining units, a contact channel to these organizations has a relatively low efficiency for the agencies, since the labor unions are likely to have relatively high intrinsic preferences regarding the cutback decision. Because labor unions are representatives of municipal workers, their main concern is to prevent lay-off reductions in workers' benefits and therefore they are relatively immune to influential efforts of agencies. Partly the same argument can be applied to explain the relatively low weights of all political agents compared to the media. Media agencies have a very low intrinsic preferences regarding the cutback decision, whereas the preferences of the political parties are much higher due to the ideological and electoral reasons. Furthermore, the bargaining power of the agencies is limited at least regarding the bureaucratic organizations D2 and D3 due to hierarchical structures of these relations. This may also partly explain the relatively high weight of the mayor's office (B2), which on the one hand is located above the top bureaucrats of the SHS (D2 and D3), but on the other hand is not directly involved in the cutback distribution within the SHS. Therefore, it can also be considered as an appropriate target for leverage strategies by the agencies which, due to the hierarchical structures, have only limited possibilities to constrain directly the top bureaucrats of the SHS. Analogously, the relatively high weight of the voluntary organizations may be interpreted as an indication of applied leverage strategies by agencies which, due to hierarchical structures, only observe limited direct bargaining possibilities. Since most of the clients are single unorganized citizens of Rivertown the low weight for this broker port seems to be plausible.

Note in this context that only the weight of D3 agents is significant, while all other weights are insignificant. Thus, overall the estimated weights can be considered as only qualitatively reasonable, while the exact quantitative constellation of the weights could not be made reasonable. This implies particularly that many other quantitative constellations corresponding to the same qualitative structure are also reasonable. Therefore our conclusion would be strengthened if we could show that the significance of the political index remains, even if we change the insignificant efficiency weights. Table 5 represents the lower and upper boundaries of the significance levels. It can be seen that the impact of political capital index remains significant at the 95% respectively 90% level according to the likelihood ratio statistic.

Table 5. Intervals of efficiency weights, for which impact of political capital remains significant on a level of 95% and 90 %

Efficiency Weights	**Significance Levels**					
	95%			90%		
	Low	*Estimated*	*High*	*Low*	*Estimated*	*High*
wd1	0.0981	1.7245	18.6037	0.0981	1.7245	53.4829
wd2	0	0.9986	0.9986	0	0.9986	99.9861
wb1	3.6481	4.0076	64.031	3.6481	4.0076	100.0382
wb2	25.0762	25.0762	100.1523	9.0457	25.0762	100.1523
wb3	0	0.0777	10.7498	0	0.0777	39.4219
wb4	0.3655	2.5745	21.2018	0.3655	2.5745	74.0381
wb5	4.0465	49.1624	121.2551	4.0465	49.1624	144.2783
wb6	0.0572	0.0572	5.0143	0.0572	0.0572	38.9283
wd3		1			1	

According to table 5 most of the 95%- and especially the 90%-intervals are relative large. Exceptions are the 95%- interval of d2 as well as of b2. While for d2 the upper boundary could not be extended above to its optimal estimated value, for b2 the lower boundary could not be extended under its optimal estimated value. Nevertheless, the calculated intervals in table 5 imply that the impact of the political capital index remains significant at least on the 90% level for a very large set of different quantitative efficiency parameter constellations that are only restricted to the qualitative structure of relatively high efficiency weights for the mass media organizations (B5) and the mayor's office (B2) as well as a low relative efficiency weight for the bureaucrats of the SHS D2 and D3. Since, this qualitative structure seems more than reasonable given the political arena in Rivertown, we overall can conclude that despite the methodical problems discussed above, the empirical results support our hypothesis 1. But, the empirical analysis implies also that political capital, i.e. social structure, despite its significance has a relatively small impact on the cutback decisions in Rivertown, while the main determinants seem to be more located in the general institutional and political framework. Only if one controls for these determinants, e.g. among agencies of the same protection cluster, favorable network positions, as political capital causes minor improvements on the fixed average cutbacks. But exactly this feature may be extended to the general property of social capital individually possessed in competition: *producing small, but meaningful differences among competitive actors that are equivalent with respect to the variables mainly determining the outcome of the process, but being generally unable to compensate for big qualitative differences among these variables.*

5 Conclusions

Instead of recapitulating the detailed findings of the previous chapters, only the major conclusions concerning the impact of communication networks on policy outcomes will be summarized here. We began our study by introducing a general framework of political decision-making in which the two stages of decision-making (i.e. the formal and informal) were modeled simultaneously. Any political decision can generally be defined as a collective and multidimensional decision of political agents. Analyzing only the formal decision-making the main question is to provide a specification of the function reflecting transformation of the vector of individual preferences of political agents into one commonly chosen policy outcome by a given institutionalized voting procedure. Instead of deriving complete specification of this transformation function, we only assumed some commonly acceptable properties of this function such as: for any given institutional voting procedure a voting power for each agent g can be defined and secondly that the individual preferences of each political agent are at least weakly separable in the policy decision and thus can be represented by the two stage utility function in which each agent on the lower stage has a single-peaked preference over each issue dimension, and that on the upper stage subutilities are combined with unique utility index over the whole multidimensional policy outcome according to the macro-utility function, which is assumed to be a well-behaved utility function. The general properties based on these assumptions suggest first of all that for every agent g a change that provides him with a higher institutional power will also shift the final legislative decision to the direction of his preferred position or at least leave the final decision unchanged. Secondly, if an actor g changes his politically preferred position regarding any issue dimension h the final legislative decision concerning this issue will be shifted to the same direction as the preferred position of actor g has been changed or it will at least remain unchanged. And furthermore, that the change is a non-decreasing function of the institutional control of the agent and that, for every actor g there exists at least one feasible position for which a positional shift has a significant impact on the final policy decision.

But, since political agents are also socially embedded in the whole set of actors having interests on certain policies, it follows that also other actors in a policy domain receiving a welfare corresponding to given policy outcome try to influence the political decision. We have showed how these influence attempts can be modeled by applying the cooperative n-person bargaining model of Harsanyi. The political influence of an organization was determined by its relative ability to influence the relevant conditions, so that the conditional preference ordering of a powerful political agent will be more in his favor. We proposed that this could be done for example by providing valuable information to the political agent or by offering political support or threatening by political opposition in the case of unfavorable political decision. The more efficient an actor is in producing favorable conditions for institutionally powerful agents (compared to other actors) the higher is c.p. his political influence. Since each influence effort requires the existence of a direct or indirect interaction channel to political agents, a main determinant of this technical efficiency is seen in actor's positions in political communication networks. Formally, since the communication structures of an actor is taken as quasi-fix input in the political power function, this can be interpreted as political capital.

In general we understand political capital parallel to Burt as an individual resource corresponding to a given social structure, but nevertheless apply a somewhat different method transforming given network structures into actor specific political capital indices. We first present a simple definition by assuming that all the nodes are homogeneous, that is, all agent and broker contacts, in our case, have an equivalent role according to their effectiveness to produce political influence. This is, however, a rather restricted assumption, since reaching different nodes in political network provides an agency very different opportunities relation to the achievement of policy goals. Therefore the heterogeneous relations should be aggregated to one consistent social capital index by weighting each tie with its relative value corresponding to the target achievement. This can be done only by using one unit of this relation as an indicator of the weight. We demonstrated in chapter 3.4, how this was done.

Our empirical part was to test the impact of political communication, seen as political capital, on final policy outcomes. For doing this we reanalyzed the Rivertown cutback decision-making data (Uusikylä 1993b). Our main hypothesis was the following: *the greater the amount of political capital of an organization the less it will be cut back.* We also assumed that *the higher the communication density among functionally equivalent service agencies the lower their observed cutbacks*. This argument is based on the assumption that the higher the density, the lower the trust establishing costs within a coalition. In the Rivertown case, we had three types of players in the cutback arena: decision bodies, external brokers and individual service agencies. We computed political capital indices for the different actors of the network. We also wanted to control other determinants of cutbacks by introducing dummy variables based on exogenous protection mechanisms such as legislation and political support of different service programs. We started the empirical analysis with an estimation of the nonlinear regression model. This was done in two stages. On the first stage we estimated the general form of our equation which allowed different intercepts for each protection cluster and different slope parameter of the political capital index. Because of the technical estimation problems of non-linear models we set the interaction effect of the slope for the mid-protected cluster to zero and separated the general model into the two submodels which we connect over loops. By applying variance analysis we also tested our second hypothesis, i.e. the impact of block density on budgetary cutbacks.

The results of the regression analysis suggested that political capital has a negative impact on the implemented cutbacks for the agencies with low or medium institutional protection. This seems to suggest that political capital has somewhat less an importance for highly protected agencies for reducing budgetary cutbacks. Nevertheless, one should be very careful when interpreting this, since the slope parameter in this block was not significant and the sum was close to zero. Another important finding was that none of the other centrality and prestige measures tested produced significant results. Also, the block densities seemed not to have an expected impact on budgetary cutbacks. This rejects our collective bargaining hypothesis.

The estimation of the weights of different bargaining channels gave a rather surprising results. The media agencies and the mayor's office were the brokers with the highest relative weights. The next important brokerage channels were the voluntary organizations and political parties, whereas the labor unions and the clients appeared to have rather unimportant positions as brokers, even if they were among the most central brokers in the communication network. Also the political board and the top-bureaucrats of Rivertown received low efficiency weights. These findings indicate that service agencies applied „invisible" and cautious indirect leverage strategies to influence decision bodies in order to maintain their administrative reputation, important for the survival under scarcity. One can also see that agencies with rather high and stable intrinsic preferences such as labor unions appeared to be less efficient brokerage channels, whereas media agencies having lower preferences suited better for the indirect bargaining. Due to the emphasis on the implementation process of the cutbacks the lower administrative agents had the most significant role among the decision bodies during informal bargaining processes. As a final conclusion we state that political capital appears to have an important impact on policy outcomes, even if it is not the factor that „drives the system". It can be considered more as an important additional resource that makes the difference among the competitive actors.

References

Beauchamp, M.A. (1965): An Improved Index of Centrality. *Behavioral Science* 10: 161-163.

Beck-Jorgensen, T. (1987): Financial Management in the Public Sector. In J. Kooiman and K. Eliassen: *Managing Public Organization. Lessons from Contemporary European Experience*. London: Sage Publications.

Black, D. (1958): *The Theory of Committees and Elections*. Cambridge, Mass.: Cambridge University Press.

Bueno de Mesquita, B. and Stokman, F. (1994): Models of Exchange and of Expected Utility Maximization: A Comparison of Accuracy. 214-228. In Bueno de Mesquita, B. and Stokman, F. (eds): *European Community Decision Making: Models, Applications, and Comparisons*. New Haven: Yale University Press.

Burt R.S. (1992): *Structural Holes. The Social Structure of Competition.* Cambridge, Mass.: Harvard University Press.

Coleman, J.S. (1973): *The Mathematics of Collective Action.* London: Heinemann Educational Books.

Coleman, J.S. (1986): *Individual Interests and Collective Action. Selected Essays.* London: Cambridge University Press.

Coleman, J.S. (1990): *Foundations of Social Theory.* Cambridge, Mass.: The Belknap Press of Harvard University.

Dowding, K. (1994): *Model or Metaphor? A Critical Review of the Policy Network Approach.* Working Paper. London School of Economics and Political Science.

Enelow, J.M and Hinich, M.J. (1990): Advances in the Spatial Theory of Voting. London: Cambridge University Press.

Freeman, L.C. (1979): Centrality in Social Networks I. Conceptual Clarification. *Social Networks* 1: 215-239.

Gabbay, S. (1994): *Social Capital Revisited.* Mimeo Columbia University, New York.

Gargiulo, M. (1993): Two-step Leverage: Managing Constraint in Organizational Politics. *Administrative Science Quarterly*, 38. 1-19.

Granovetter, M.S. (1973): The Strength of Weak Ties. *American Journal of Sociology* 78: 1360-1380.

Hall, B.H. (1983): *User's Manual of Time Series Processor* (TSP), Version 4.0, TSP International.

Harsanyi, J.C. (1963): A Simplified Bargaining Model for the n-Person Cooperative Game. *International Economic Review*, 4: 194-220.

Harsanyi, J.C. (1977): *Rational Behavior and Bargaining Equilibrium in Games and Social Situations*. London: Cambridge University Press.

Henning, Ch.H.C.A. (1994a): *Politische Tauschmodelle auf der Grundlage des LES- und AIDS-Systems* (Political Exchange Models on the basis of the LES- and AIDS-System), Working Paper No. 5 AB. II, Mannheim Centre for European Social Research AB II.

Henning, Ch.H.C.A. (1994b:): *Ableitung spieltheoretischer Ansätze zur Modellierung des politischen Einflusses von Interessengruppen im Politikfeld der Europäischen Agrarpolitik* (Derivation of game theoretical approaches modelling the political influence of interest groups in the European Agricultural Policy Domain, Working Paper No. 6 Mannheim Centre for European Social Research AB II.

Henning, Ch. H.C.A. (1994c): *Towards a Rational Choice Approach to Collective Decision Making Process in Democratic Political Systems*. Unpublished paper. University of Chicago and University of Mannheim.

Kappelhoff, P. (1993): *Soziale Tauschsysteme. Strukturelle und dynamische Erweiterungen des Marktmodells.* München: R. Oldenburg Verlag.

Kenis, P. and Schneider V. (1991): Policy Networks and Policy Analysis. Scrutinizing a New Analytical Toolbox. 25-59 in B. Marin/ R. Mayntz (eds.): *Policy Networks: Empirical Evidence and Theoretical Considerations.* Frankfurt am Main: Campus Verlag.

Knoke, D. and Burt, R.S. (1983): Prominence. 195-222 in Burt, R.S. and Minor, M.J. (eds.): *Applied Network Analysis.* Newbury Park, CA: Sage Publications.

Knoke, D., Pappi, F.U., Broadbent, J., Tsujinaka, Y. (eds.) (1995): *Comparing policy networks.* Cambridge, Mass.: Cambridge University Press. Forthcoming.

Kotter, J.P. (1985): *Power and Influence*. New York: Free Press.

König, T. (1992): *Entscheidungen im Politiknetzwerk. Der Einfluß von Organisationen auf die arbeits- und sozialrechtliche Gesetzgebung in den 80er Jahren.* Wiesbaden: Deutscher Universitätsverlag.

Kruskal, J.B. (1982): Multidimensional Scaling by Optimizing Goodness of Fit to a Non-metric Hypothesis in Davis, P.M. and Coxon, A.P.M. (eds.*): Key Texts in Multidimensional Scaling*. London: Heinemann.

Laumann, E.O. and Knoke, D. (1987): *The Organizational State. Social Choice in National Policy Domains.* Madison: University of Wisconsin Press.

Marsden, P.V. and Laumann, O. E. (1977): Collective Action in a Community Elite: Exchange, Influence resources, and Issue relation. 199-250. In Liebert, R.J. and A.W. Imersheim (eds.): *Power, Paradigms and Community Research.* Berverly Hills: Sage.

Myerson, R.B. (1977): Graphs and Cooperation in Games. *Mathematics of Operations Research* 2: 225-229.

Nash, J.F. (1953): Two Person Cooperative Games. *Econometrica* 21: 128-140.

Niskanen, W. (1971): *Bureaucracy and Representative Government.* Chicago: Aldine-Atherton Press.

Olson, M. (1965): *The Logic of Collective Action. Public Goods and the Theory of Groups.* Cambridge: Harvard University Press.

Olson, M. (1985): Space, Agriculture, and Organisation. *American Journal of Agricultural Economics* 67: 928-37.

Osborne, M.J. and Rubenstein, A. (1990): *Bargaining and Markets.* San Diego: Academic Press.

Owen, G. (1986): Values of Graph-restricted Games. *SIAM Journal of Algebraic and Discrete Methods* 7: 210-220.

Pappi, F.U. und Kappelhoff, P. (1984): Abhängigkeit, Tausch und kollektive Entscheidung in einer Gemeindeelite. *Zeitschrift für Soziologie* 13: 87-117.

Pappi, F.U. und Kappelhoff, P. und Perner, R. (1979): *Analyse sozialer Netzwerke.* Arbeitsbericht, Universität Kiel.

Pappi, F.U. und König, T. (1993): *Informationstausch in politischen Netzwerken.* Unveröffentlichtes manuskript, Universität Mannheim.

Pappi, F.U. und König, T. und Knoke, D. (1995): *Entscheidungsprozeße in der Arbeits- und Sozialpolitik. Der Zugang der Interessengruppen zum Regierungssystem über Politikfeldnetze: Ein deutsch-amerikanischer Vergleich,* Frankfurt: Campus Verlag. In print.

Pappi, F.U. (1993):Policy Netze: *Erscheinungsformen moderner Politiksteuerung oder methodischer Ansatz*?. Unveröffentlichtes Manuskript, Universität Mannheim.

Rosenthal, E.C. (1988): Communication Networks and Their Role in Cooperative Games. *Social Networks* 10: 255-263.

Rubin, I.S. (1993): *The Politics of Public Budgeting. Getting and Spending, Borrowing and Balancing.* Chatham, NJ.: Chatham House Publishers, Inc.

Sen, A. (1995): Rationality and Social Choice. *American Economic Review,* 85: 1-24.

Stephenson, K. and Zelen, M. (1989): Rethinking Centrality. Methods and Applications. *Social Networks* 11: 1-37.

Stokman, F. and Van den Bos, J.M.M. (1992): A Two-Stage Model of PolicyMaking with an Empirical Test in the U.S. Energy -Policy Domain. *Research in Politics and Society* 4: 219-253.

Uusikylä, P. (1993a): Sosiaali- ja terveydenhuollon säästöt ja paikallishallinnon politiikkaverkostot. (The Cutbacks of Social and Health Care Expenditures and Local Government Policy Networks) 105-204. In STM: *Hyvinvointivaltiosta kilpailuvaltioon. Markkinat ja verkostot sosiaali- ja terveyspolitiikan ohjauksessa.* Ministry of Health and Social Affairs Publications 1993: 4. Helsinki: Yliopistopaino.

Uusikylä, P. (1993b): *The New Politics of Retrenchment.* Paper presented at the European Consortium for Political Research (ECPR) Joint Session in Leiden, 2.-8. April 1993.

Wasserman, S. and Faust, K. (1994): *Social Network Analysis: Methods and Applications.* Cambridge, Mass.: Cambridge University Press.

Wildavsky, A. (1988): *The New Politics of the Budgetary Process.* Glenview, Ill: Scott, Foresman/ Little Brown.

Zusman, P. (1976): The Incorporation and Measurement of Social Power in Economic Models. *International Economic Review*, 17: 447-62.

Appendix 1.

Organizations' involvement to service programs

Units	Programs 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
HC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HC2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HC3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HC4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC1	0	0,4	0,1	0,1	0,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC2	0	0,4	0,1	0,1	0,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC3	0	0,4	0,1	0,1	0,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC4	0	0,4	0,1	0,1	0,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC5	0	0,4	0,1	0,1	0,2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HA1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,8	0	0	0	0	0	0	0	0	0	0
HA2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,8	0	0	0	0	0	0	0	0	0	0
DA1	0	0	0	0	0	0	0	0	0	0	0	0	0,2	0	0	0	0	0	0	0,1	0	0	0	0,1	0
DA2	0	0	0	0	0	0	0	0	0	0	0	0	0,2	0	0	0	0	0	0	0,1	0	0	0	0,1	0
DA3	0	0	0	0	0	0	0	0	0	0	0	0	0,2	0	0	0	0	0	0	0,1	0	0	0	0,1	0
DA4	0	0	0	0	0	0	0	0	0	0	0	0	0,2	0	0	0	0	0	0	0,1	0	0	0	0,1	0
ALC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0	0	0	0	0	0	0	0	0
ALC2	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0	0	0	0	0	0	0	0	0
ALC3	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0	0	0	0	0	0	0	0	0
ALC4	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0	0	0	0	0	0	0	0	0
FH1	0	0	0	0	0	0	0	0	0	0	0	0,2	0	0	0	0	0	0	0	0	0,2	0,1	0	0	0,1
FH2	0	0	0	0	0	0	0	0	0	0	0	0,2	0	0	0	0	0	0	0	0	0,2	0,1	0	0	0,1
WC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,8	0,1	0,1	0	0	0	0	0
FC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FC2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCP1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCP2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DCP1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DCP2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAP1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

(App. 1 continues...)

	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
HC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0,1	0,1	0	0,3	0	0
HC2	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0	0	0	0	0	0	0	0	0,8	0
HC3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0,1	0,1	0	0,3	0	0
HC4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,3	0	0	0,1	0,1	0	0,3	0	0
DC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DC5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HA1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HA2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DA1	0	0,1	0,2	0	0,1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DA2	0	0,1	0,2	0	0,1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DA3	0	0,1	0,2	0	0,1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DA4	0	0,1	0,2	0	0,1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALC2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALC3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ALC4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FH1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FH2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FC1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FC2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HCP1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0	0	0,5
HCP2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0,5	0	0	0,5
DCP1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DCP2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAP1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(Appendix 1 continues ...)

	Number	Programs		
Social	1	Joint expenditures for social services	26	Summer home programs for children
Services	2	Public day care services	27	Recreation programs for mentally handicapped
(1-36)	3	Purchased day care services	28	Service programs for the disabled
	4	Family day care programs	29	Transportation services for the disabled
Health	5	Play and action programs for children	30	Purchased service programs for the disabled
care	6	Day care services for the disabled	31	Other social service programs
services	7	Housing programs for the handicapped	32	A-clinics
(37-51)	8	Housing programs for the alcholics	33	Purchased a-clinic services
	9	Housing programs for the elderly	34	Day-time services for the elderly
	10	Other social welfare housing programs	35	Purchased day-time services for the elderly
	11	Public foster homes	36	Family councelling and advisory programs
	12	Purchased services for the orphans	37	Part-time staff for health care
	13	Purchased services for the disabled	38	Psychologist services
	14	Recreation programs for the alcholics	39	Ambulance services
	15	Homes for the elderly	40	Computer operations for the medical centres
	16	Purchased service programs for the eld	41	Medicine supply
	17	Other purchased service programs	42	Joint expenditures for the health care
	18	Public workshops for the handicapped	43	Maternity clinics and child welfare services
	19	Support programs for the socially restri	44	Consulting hours services
	20	Sheltered work purchased programs	45	Doctors' home visits
	21	Childrens' forster family program	46	Laboratory services
	22	Other foster programs	47	X-ray services
	23	Purchased program for family services	48	Action therapy and recreation
	24	Family programs for the disabled	49	Emergency clinics
	25	Holiday programs for children	50	Hospital services
			51	Medical recreation

Appendix 2.

Table 3. The results of the regression analysis for testing other centrality indices

	Constant	DH	DM	XA	XA x DH	XA x DM	$\bar{R}^2$
							.60
α_0	.140755 (3.06307)						
α_H		-.124836 (-2.13960)					
α_M			-.125885 (-2.56558)				
β_0				-.127912 (-2.69160)			
β_H					.157342 (.031545)		
β_M						.308000 (.061306)	

1) T-values are in parentheses

Table 4. ANOVA results of the impact of communication density in different protection groups to the observed cutbacks.

Communication Density in Coalition-Network (K_S)	Protection Cluster (D_P)		
	Low (1)	*Medium* (2)	*High* (3)
Low (0)	0 (0)	1.37 (9)	28.83 (5)
High (1)	140.64 (4)	41.84 (6)	7.11 (4)

F-Tests:

		F	Sig. of F
Main effects			
	Ks	21,517	,000
	Dp	23,255	,000
2-way Interactions			
	Ks Dp	6,812	,016
Total		18,710	,000