

ON SOCIAL CAPITAL AND PRIVATE PROVISION OF PUBLIC GOODS

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We use a basic model of private voluntary contributions to a public good with interdependent individual utilities to study the effect of social network structure on provision of a public good. We compare the effects of 'bridging' and 'bonding' social capital on individual willingness to contribute to provision of a global public good.

Our interest is motivated by two economic contexts. First, in **development studies** social capital (that is a function of the structure of the social network) is believed to be an important factor in enabling a collective action. An increasing number of field studies find that social capital is an essential element for community-driven development as it has been found to be a statistically significant predictor for provision/absence of community-level public services. Pargal et al. (2002), Isham & Kahkonen (2002), Motiram & Osberg (2010) found that community-level collective actions concerning development projects are more likely in communities with higher levels of social capital. Theory and emerging empirical evidence (e.g. Motiram & Osberg, 2010) suggest a distinction between "bonding" and "bridging" social capital, where the former refers to social relations within pre-existing groups of individuals, while the latter refer to the connections which cut across such groups. On average a social tie spanning across diverse groups within the community has larger effects on likelihood of collective action than a tie connecting individuals within already densely connected group.

The other context motivating our interest in the effect of network structure on production of public good is taken from **economics of innovation**. It has been long recognized that knowledge has certain properties of a public good (Arrow 1962), and therefore it is underproduced if production relies on private voluntary contributions. However, there are other rationales that may affect firm's incentives to perform R&D. First, assimilation and utilization of knowledge may require firm's investment in R&D to strengthen its own absorptive capacity which is complementary to public knowledge (Cohen and Levinthal 1989). Further, tacit part of generated knowledge does not flow freely into public domain, but may spillover to other firms through a network of interfirm interactions, for instance, in the context of joint R&D or social relationship between individual inventors. As the intensity of spillovers depends on firm's position in the knowledge network, we may expect that the structure of the network is important in shaping firms' decisions to engage in R&D.

Our model relates to two streams in economic literature. First, there are several influential studies which analyze the relationship between the structural properties of networks and investment in 'local' public goods (Bramoullé & Kranton, 2007; Ballester et al., 2006). This literature provides several important insights in how networks matter. Notice, however, that the models typically developed and analyzed in this literature describe investment in local public good/'bad', such as education or crime activities, where returns on investment in public good is specific to the individual and his/her direct neighbours on the network. The results of such studies cannot be directly applied to the two economic contexts mentioned above, because in there public good is 'global' rather than 'local' as it is provided on the level of the whole community. The second kind of literature on which we base our model inquires into optimal allocations of resource among individuals with interrelated (altruistic) utility

functions (Ley, 1997; Bergstrom, 1999). However, in this line of research private provision of the public good is not analyzed.

In our model we consider a population of agents woven into a network of social relationships. Each agent chooses allocation of his/her income between consumption of a private good and a contribution to production of public good. Agent's payoff consists of two parts: ego part of utility that depends on consumption of public and private goods, and alter part that is the sum of 'utility spillovers' from agent's neighbours. We focus on the aggregate level of the production of public good.

As in a model with interrelated (altruistic) utility functions a part of positive externalities is internalized by the agent through utility spillovers to the agent from other agents, social network, in general, has a positive effect on the level of provision of public good. However, the effect of addition of a social tie on the aggregate provision of public good depends on where the tie is added. The social network not only helps to internalize part of utility spillovers, it also augments the effect of consumption of the private good because 'return' utility spillovers multiply the effect of consumption of private good (as noticed by Ley (1997) in models with altruistic agents 'private good' is, in fact, a local public good). Consequently, when taking decision concerning allocation of consumption between private and public goods agent should find balance between the marginal effect of consumption of private good augmented by 'return' utility spillovers and the marginal effect of investment in public good augmented by spillovers of increment in utilities of other agents (directly and indirectly connected to the given agent), the increment due to agent's investment in public good.

Our the main result is that (under certain conditions) we show that addition of a 'bridging' social tie has larger effect on the provision of public good than does addition of a 'bonding' tie. The basic intuition is as follows. A bonding tie increases connectivity within a group and has no or minor effect on connectivity among groups. Increasing connectivity within group shortens paths between group members stimulating private consumption due to increasing intensity of 'return' spillovers. By contrast, a bridging tie enables utility spillovers from the part of networks which without this tie were disconnected or distant from each other. Other things equal it increases marginal effect from investment into public good because with a bridging tie the agent also partly internalizes the effect from agent's investment in public good on agents who would be distant or even disconnected from him/her in absence of the bridging tie. As a result addition of a bridging tie increases investment into public good.