

Informal Networks, Institutions and the “Soap Opera” Constraint

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Abstract

What is the interplay between informal networks, such as those that facilitate risk-sharing among households, and institutions such as public transfers and formal financial intermediation? Much of the existing literature on informal networks in economics focuses on either altruism or strategic mechanisms for their formation and maintenance. This approach stands in sharp contrast to perspectives from psychology and biology, which emphasize cognitive processes associated with “bonding.” Bonding is social activity which build feelings of altruism and trust that facilitate reciprocal exchange. Findings from psychology demonstrate that bonding is subject to cognitive and time-related constraints that limit the number of group members, a phenomenon I call the “soap opera” constraint. Limits on group membership have received little attention in the economic literature on informal networks. I argue that the recognition of such limits can shed new light on the normative questions about the connection between institutions and private behavior. For example, systems of public transfers can enhance efficiency if they allow people to concentrate their limited capacity for social intrigue on the task of production rather than the sharing of risks. A binding “soap opera” constraint introduces imperfect substitutability between formal and informal mechanisms for risk-sharing, borrowing or redistribution. Recognition of limited capacity for the formation of informal networks throws new light on normative issues associated with public redistribution. While public transfers do supplant private ones, the process of crowding out of private transfers by public ones does not leave economic welfare unchanged. Public income redistribution enables a more refined division of labor in production, which can raise output and economic well-being.

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I. Introduction

What are the tradeoffs between efficiency in production and the mitigation of income risk through private transfers? The earliest work on private transfers paid little attention to the possibility of such tradeoffs. Almost by definition, private transfers did not consume resources, they only shuffled them from one household to another. But economists have begun to pay increased attention to the idea that efforts to reduce consumption risk can entail costs in terms of foregone output. This paper calls attention to a fundamental tradeoff between informal risk sharing and production, related to the idea that each of these activities takes place in groups. If there are natural limits to the size of social networks, the formation and maintenance of a more elaborate risk sharing network might come at the expense of a smaller and less efficient production team.

Managing social relationships can consume a great deal of effort and time. When people agree to trade, share, or specialize, they face the risk that their partners may renege, shirk, defect, or otherwise leave them in the lurch. Part of successful group functioning requires careful screening, perhaps by requiring new group members to pay a fee upon joining.¹ Another attribute of group management is the formulation of effective incentives for good behavior and punishments for bad behavior, along with the attendant monitoring to check if participants are adhering to the rules.² In addition, forging the bonds of altruism and trust necessary for well-functioning groups may require substantial time,

¹ See, for example, Larracore (1992), and Camichael and MacLeod (**1997).

² See, for example, Arnott and Stiglitz (1991) and Coate and Ravallion(1993).

energy and money devoted to cultivating and maintaining alliances and friendships, particularly among non-kin, who are less likely than kin to have altruistic feelings already encoded into their psychological makeup.

The costs of forming and maintaining a network is likely to impose limits on its size. Even with extensive systems of transportation and communication, there is a limit to the number of players a person can have in his or her social orbit. Consider two likely arenas for social intrigue, the “homefront” and the workplace. Suppose that, in the homefront, a group of individuals with different, and imperfectly correlated, sources of income divide the fruits of their production in an attempt to mitigate the risks of income shortfalls that threaten any single income source. In the workplace, output is produced in a team, which requires a certain amount of trust and cohesiveness to be viable. Imagine a person who shares with five other people and works with another seven. Even in these small groups, there is enormous potential for social intrigue, which can tax cognitive and emotional capabilities.³

Such limits can have important implications for economic behavior. If, to continue the example above, the upper bound on the total network size is 12, the individual may be forced to make tradeoffs between the size of the group he works with and the size of the group he shares with. In a risky environment, having a large group with which to share resources may take precedence over the formation of large production teams, leaving unexploited the opportunities for efficiency gains through finer division of labor.

³ A group of five people contains 90 possible relationships between subsets of individuals. A group of seven contains 966.

Most of the literature on consumption insurance pays little attention to the exact size of the risk sharing group, because it considers the entire panoply of methods for dealing with risk, including use of capital markets, insurance provided through employers, etc., and not just sharing among families and friends. As a result, the group used for the purposes of risk sharing has been alternatively defined as the family (e.g., Altonji, Hayashi and Kotlikoff (1992)), the village (e.g., Townsend (1994)), large geographic regions, such as subgroups of states in the United States (e.g., Sorensen and Yosha (1996)) and entire countries (e.g., Mace (1991)). So these papers pay little attention to the problem of formulating and maintaining informal risk-sharing groups.

A. The question

B. Why important

C. Deficiencies in the literature

- 1. Risk-sharing literature has not considered the limitations of the size of the group—usually considers all market**
- 2. Risk-sharing divorced from production**
- 3. Altruism in groups has led to silly results**

D. Novelty of the approach

E. The logic of the story, the bottom line, and implications

- 1. Limitations on network size**
- 2. Cognitive constraints**
- 3. Game theoretic considerations could be introduced but not necessary**
- 4. Mean-variance utility**
- 5. Tradeoff between risk-sharing and increasing returns in production**
- 6. Implications**

- a. Public transfers could enhance efficiency
- b. Positive theory of public redistribution
- c. Economic transition
- d. Group lending

II. The Network Constraint

A. The Dunbar Hypothesis—Grooming and Gossip

- 1. Primate behavior
- 2. Human behavior
 - a. Big human groups
 - b. Language is grooming
 - c. Machiavellian intelligence
 - d. Wason selection tasks
 - e. Cognitive limits

III. Gaming and Bonding

IV. The Model

A. Utility Function

With the help of some simplifying assumptions, the rudiments of the tradeoff between risk-sharing and production can be expressed as an elementary problem that shares many features with portfolio analysis. First, assume that capital markets are “perfectly imperfect,” in that individuals cannot borrow and lend, but must consume out of current income. Second, assume that utility of consumption is intertemporally separable. Third, following Markowitz (1975), assume that expected utility can be approximated by the mean and variance of expected income. These simplifications allow me to express the consumer’s problem as one of maximizing a single-period utility function, U , which depends

on expected income and its variance:⁴

$$U = (\text{expected income, variance of income}). \quad (1)$$

Expected income is generated from production accomplished by “teams” whose size is denoted by n_t . The team produces output according to the production function

$$f(n_t), \text{ with } f' > 0, f'' < 0. \quad (2)$$

Expression (2) is characterized by increasing returns to team size. Teams are also subject to output shocks, so that total output is

$$Y = f(n_t) + e'_t. \quad (3)$$

I assume that the output shock is heteroskedastic with respect to team size, so that $e'_t = n_t e_t$. Suppose further that f is of the form

$$f(n_t) = n_t^{1+a}, \quad a > 0. \quad (4)$$

The team disburses to each member a paycheck, y , which is equal to per-capita production, so that

$$y = n_t^a + e_t. \quad (5)$$

I assume that $E(e_t) = 0$, and that the variance of e_t is constant across teams, so

⁴ Further, since considerations of “gaming,” such as trigger strategies for punishing defectors in a risk-sharing network, are suppressed, I do not lose anything essential in focusing on a single-period framework.

that $\text{Var}(\mathbf{e}_t) = \mathbf{s}^2 > 0 \forall t$.

The variance of income is determined by the size of the “clan,” a group of people who pool their paychecks and consume out of a common pot. The purpose of the clan is to mitigate income risk, and therefore each clan member belongs to a different team, to prevent paychecks from being subject to undue positive covariation. Per-capita clan income, \bar{y} , is $\sum_{i=1}^{n_t} y_i / n_t$. Expected income is therefore

$$E(\bar{y}) = r_t^a. \quad (6)$$

If one team’s output were uncorrelated with that of any other team, the variance of expected income would simply be \mathbf{s}^2/n_t . But suppose there is the possibility of covariate risk, in the sense that the correlation between the output of any two teams is r , where $0 \leq r \leq 1$. In this case, the variance of expected income is given by

$$\text{Var}(\bar{y}) = \frac{\mathbf{s}^2}{n_t} + \frac{(n_t - 1)}{n_t} r \mathbf{s}^2. \quad (7)$$

The final consideration concerns the size of the network. In light of the arguments about networks discussed above, I assume that the sum of teammates and clanmates cannot exceed a fixed number, n_ϕ .

$$n_t + n_c \leq n_\phi. \quad (8)$$

Expression (8) is the “soap opera” constraint. Because of limited cognitive

capabilities, time constraints, and the like, an individual cannot have more than n_t persons in his or her network.⁵

B. The Determination of Teams and Clans

The utility function, production function and the soap-opera constraint combine to highlight a well-defined tradeoff between team size and clan size. Individuals who work on large teams have little emotional energy left over to manage more than a small clan. They thus enjoy higher expected income, but must endure higher income variation. The converse holds for those who live in relatively large clans. It remains to be determined how such clans and teams are formed, however.

First, consider the optimal team and clan size from an individual's point of view. The person would want to choose n_t and n_c to maximize utility.

Substituting (6), (7) and (8) into (1) yields the following problem:

$$\max_{n_t, n_c} U \left(n_t^a, \frac{s^2}{n_t} + \frac{(n_c - 1)}{n_c} r s^2 \right). \quad (9)$$

If the soap-opera constraint (8) is binding, the maximization of (9) leads to the following first-order condition:

$$U_1 \frac{\partial \bar{y}}{\partial n_t} = U_2 \frac{\partial \text{Var}(\bar{y})}{\partial n_c}. \quad (10)$$

⁵ A more realistic formulation might introduce nonlinearities into the constraint. For example, it may be that the costs of forming, understanding, and maintaining relationships rises faster than group size. And separate costs might apply to teams versus clans. The linear form of the constraint is a convenient simplification which does not affect any of the results of interest here.

The marginal utility of an additional teammate, which is the boost in paycheck size times the marginal utility of expected income, is balanced against the marginal utility that an added clanmate would confer through reduction in the variance of income. The latter is the product of the marginal reduction in the variance of income and the marginal disutility of income variance.

But is it possible to field these teams and clans? Imagine a group of N individuals with no current clan or team affiliation. Suppose that they are all identical in their preferences and constraints, so that they each have the same desired clan and team size, n_c^* and n_t^* , respectively. Assume that someone coordinates the formulation of teams and clans, adhering to the restriction that no one has a teammate in his clan and that clans comprise individuals from distinct teams. This restriction serves the purposes of risk diversification. This configuration of teams and clans is always possible as long as N is exactly divisible by both n_c^* and n_t^* .

First-order condition (10) implies the following comparative statics results:

$$\frac{\partial n_c^*}{\partial s^2} > 0, \quad \frac{\partial n_c^*}{\partial r} < 0, \quad \frac{\partial n_c^*}{\partial a} < 0.$$

The first two results are standard implications of informal risk sharing. The larger is the variance of per-capita team output, the larger the desired clan size. The more highly correlated is the output of individual teams, the less effective is risk pooling, and hence the smaller the optimal clan size. The third result, though, is a unique implication of the soap-opera constraint model. An increase in a , stemming, say, from a rise in the gains from the division of labor, causes a

reduction in desired clan size. Constraints on the total network size introduce a tradeoff between the proficiency of the team in production and the effectiveness of the clan in risk-sharing. The larger are the increasing returns from team size, the smaller the desired clan.

C. The Impact of Public Income Redistribution

Consider the impact of the creation of a “social safety net” in the context of the model described above. A social safety net is defined as a pooling arrangement that extends beyond one’s informal network, so that all N individuals in the economy participate. The most obvious effect that such a safety net would have is to increase the size of the risk-sharing pool, thus enhancing economic well-being by reducing the variance of income. But expansion of income sharing outside private networks would just as obviously entail costs as well, such as administrative costs connected with the necessary taxes and transfers, or reduced work incentives from pooling resources with a larger risk-sharing group. The utility associated with public income redistribution is given in expression (11) below.

$$U^{Pub} = U \left(r_{\theta}^a - t, \frac{s^2}{(N - n_{\theta})} + \frac{(N - n_{\theta} - 1)}{(N - n_{\theta})} r s^2 \right) \quad (11)$$

The effect of the larger risk-sharing pool is captured in the second term in expression (11): income variance is reduced by $N - n_{\theta}$, which exceeds n_{θ}^* . The deadweight losses from public income redistribution are captured by the term t .

But there is a further, efficiency-related effect of public income redistribution—it allows for a better exploitation of increasing returns in production from the use of larger production teams. If increasing returns are large enough relative to administrative and disincentive costs of public income redistribution, production net of deadweight losses in the public-income-redistribution regime, $r_{\bar{n}}^a - t$, can exceed production in the informal risk-sharing regime, $r_{\bar{n}}^a$.

Define the “reservation price” of public income redistribution, t^* , as the value of t such that equates an individual’s well-being in the public-income-redistribution regime and the informal risk-sharing regime. The value of t^* is defined implicitly by

$$U\left(r_{\bar{n}}^a - t^*, \frac{s^2}{(N - \bar{n})} + \frac{(N - \bar{n} - 1)}{(N - \bar{n})} r s^2\right) - U\left((\bar{n} - \bar{n}^*)^a, \frac{s^2}{\bar{n}^*} + \frac{(\bar{n}^* - 1)}{\bar{n}^*} r s^2\right) = 0. \quad (12)$$

Assume, as in, for example, Becker and Murphy (1998), that state interventions are guided, at least in part, by efficiency considerations, so that there would be a stronger tendency toward public income redistribution when the willingness to pay for such redistribution, captured by the term t^* , is increased. The impact of the various model parameters on the reservation price of public income redistribution are given below:

$$\frac{\partial t^*}{\partial a} > 0, \quad \frac{\partial t^*}{\partial s^2} > 0, \quad \frac{\partial t^*}{\partial r} < 0.$$

The novel prediction is that the “demand” for social safety nets rises with the

efficiency of team production, as captured by the term a . If state involvement in social insurance is determined by efficiency considerations, i.e., a tendency to maximize to maximize utility, then we should observe more social insurance in settings in which increasing returns in team production are high. Suppose, for example, that a were high enough that the actual value of t were less than t^* . Then each of the N individuals in the economy would favor public income redistribution over informal risk-sharing. One implication of the model is that the introduction of industrialization, with its usage of large production teams, should spur the adoption, through collective choice, of social insurance schemes. Such schemes can enhance efficiency by helping to alleviate efficiency losses in production from the soap-opera constraint.

II. Constraints on Network Size—Evidence

A. Production

- 1. Lin's evidence**
- 2. Organizational behavior studies**
- 3. Other work on the division of labor**

- a. Becker and Murphy (1992)
- b. Locay JPE 1990

A. Risk-sharing

- 1. Stack (1970)
- 2. Lomnitz (1977)

B. Aggregate network constraint—Berman (1998)

VI. Implications and Extensions

A. Group lending

- 1. Targeting of women
- 2. Post-loan income growth

B. Expansion of public income redistribution

- 1. Tech. change leads to income redistribution
- 2. Extant theories have trouble explaining redistribution
 - a. Becker's "pressure group" theory
 - b. Hochman and Rogers altruism theory and Easterly evidence
- 3. Decline in "morals" and "norms"

C. Connection between kin groups and economic growth

Temple and Johnson, Adelman and Morris

D. Associational activity and growth—Knack and Keefer

E. Economic Transition and Public Safety Nets

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