Social Rewards, Externalities and Stable Preferences

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1. Introduction.

There are three types of incentives that govern the behavior of individuals in society: (i) private rewards such as wages and profits, (ii) social rewards such as prestige and status, (iii) rules and laws that enforce a certain type of behavior and penalize deviations. Casual observation indicates that societies differ in the mixture of incentives and rules they employ. Thus, in order to understand how societies function, one of the fundamental questions is why certain activities are subject to enforcement while others are governed by social rewards and conventions.

As is well recognized in the economic literature, activities which affect other members of the society, but cannot be priced, are not efficiently regulated by private rewards. It was Arrow (1971) who first suggested the role of social norms as a mechanism designed to resolve the inefficiencies arising from externalities[1]. In this paper we consider a similar role for social rewards such as prestige and status. That is, an individual who chooses an action that has a positive externality is appreciated and esteemed by the other members of society, while an individual who causes a negative externality is treated with contempt.

The use of enforcement mechanisms is in most cases costly. Beside the direct cost of implementation, one can imagine the costs of living in a society with too many laws and regulations.

[1]See Elster (1989) for a criticism on Arrow's approach and Fershtman, Murphy and Weiss (1995) for an analysis of the implications of social rewards for the allocation of talent in society.

On the other hand, social rewards, such as prestige and status, appear to be relatively cheap. It may be costly to identify the deserving individuals, but the transfer of esteem to those who benefit society does not detract resources from the givers of social appreciation. The main question is under which circumstances social rewards provide effective and feasible incentive mechanism that may replace laws and regulations. In particular, why should a selfish individual care about what other people think about him? The purpose of this paper is to characterize the circumstances in which evolution would lead to the survival of socially minded individuals, even though fitness is determined only by economic payoffs[2].

We consider a simple model in which individuals are randomly matched and are involved in a two-person interaction. Their actions generate externalities which influence all individuals in society. We assume that social status of an individual is determined by his own action and the actions taken by the other members of society. Individuals, however, can differ in the importance which they assign to social rewards. Some may care about the opinion of others while others do not. The individuals' type is assumed to be observable. We do not assume any a-priori profile of types but we look for the one that emerges as an outcome of an evolutionary process.

Our analysis points at some important constraints on the use of social rewards as a method for counteracting externalities. It is possible to induce individuals to increase activities which cause positive externalities. It is not possible, however, to induce them to curtail activities which cause negative externalities. The basic reason is that social rewards are effective only if they increase fitness.

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[2] For evolutionary models that endogenize preferences see Dekel and Scotchmer (1994) and Robson (1994) who discuss risk aversion and Rogers (1994) who discusses time preference. For evolutionary models of ethical values and social norms see Hirshleifer (1980) and Basu (1992). Bester and Guth (1994) analyze the evolution of altruistic preferences.

If social rewards reduce fitness, then one needs some enforcement mechanism to correct for the negative externalities. For example, if polluting yields negative externalities it is not sufficient to punish the polluter by reducing his status. Such a mechanism is not evolutionary stable. Therefore, legal enforcement is commonly used. In contrast, higher status can induce more schooling. Provided that the status given to educated workers is not excessive, individuals who care about status and who therefore increase their schooling can survive in the long run.

2. The Model

Consider a society in which there is a large number of non-atomistic identical individuals. At each period individuals are randomly matched into pairs and play the following game: Each player chooses an action $x_i \in R_+$. The payoff of player i consists of two parts. The first part is the direct payoffs, denoted by $P^i(x_i,x_j)$, and the second part is an externality term which depends on the actions of *all* the players in society. Specifically, we let the monetary payoff of player i, who is matched with player j, to be

$$U^i(x) = E(x^e)P^i(x_i,x_j) \qquad \textbf{(1)}$$

where **x** is the profile of all actions in society and x^e is its average value.

We define actions in such a way that the first partial derivative of $P^i(x_i,x_j)$, with respect to x_i, is positive when evaluated at $(0,x_j)$. That is, an action for player i is defined to have a positive impact on his payoff, for a sufficiently low level of activity[3]. We assume symmetry in the sense that the form

[3] This normalization allows us to distinguish "do" and "do not " types of actions. Thus, if a certain "do" action has a negative effect on payoffs we will refer to the "do not " as our normalized action.

of the payoff function does not depend on the identity of the players, i.e., there exist a function $P(x_i,x_j)$ such that $P^i(x_i,x_j)=P(x_i,x_j)$ and $P^j(x_i,x_j)=P(x_j,x_i)$. The payoff function $P(x_i,x_j)$ is assumed to be twice continuously differentiable and strictly concave in (x_i,x_j). We also assume that $P_{11}(x_1,x_2)$ $P_{22}(x_2,x_1)>P_{12}(x_1,x_2)$ $P_{21}(x_2,x_1)$ where subscripts are used to denote partial derivatives.

We consider two forms of pairwise interaction between players. The first case is when the total and marginal payoffs to player i increase with the action of player j. We denote this case as *complementary actions*. The other case is when the total and marginal payoffs of player i decrease with the action of player j. We denote this case as *competing actions*. These definitions are more restrictive than the usual classification into strategic complements and substitutes (see Bulow, Geanakoplos and Klemperer (1985)), since we require that the effect of the rival's action on both the total and the marginal payoffs to be of the same sign. Throughout this paper we consider only payoff functions which represent either competing or complementary actions.

The function $E(x^e)$ captures an externality effect, whereby, the aggregate (average) actions of all individuals influence the outcome in pairwise interactions. We assume that $E(x^e)$ is positive for all x^e. When $E(x^e)$ is an increasing (decreasing) function we say that there are positive (negative) externalities.

We follow the sociological approach and assume that individuals care about their standing in the community. Social rewards take the form of conferring prestige or social status. We assume that social status depends on comparisons of individual actions to those chosen by other members of society. For simplicity, we assume that only the average action of other members of society matters in these comparisons. We denote the social status function by $S(x_i,x^e)$ which is assumed to be twice continuously differentiable and strictly concave in x_i.

The objective function of all individuals is of the following additive form:

$$V^{i}(x) \equiv \alpha S(x_i, x^{e}) + U^{i}(x) \qquad \textbf{(2)}$$

where α, $\alpha \in \{0,1\}$, is a preference parameter that describes how important is social status to the individual. An individual with $\alpha=1$ cares about what other individuals think about him. An individual with $\alpha=0$ does not care what others think about him. This formulation capture the idea that people may differ in the importance they assign to their status. Although we allow only two types, the analysis can be extended to any finite number of types when types may vary only with respect to the importance they assign to social status. Note the dual roles of the parameter α and the status function S(.,.). The social status function describes what other members of society think about an individual, while the parameter α describes how much an individual cares about what other individuals think about him.

We assume that when two players are matched, their types are observable. Thus each player recognizes the type of player he is matched with. In practice, some signaling is required to indicate the type. In this paper we do not analyze the role of signaling and develope our main points in the context of a simple model with full observability.[4]

Since there is a large number of non-atomistic players, each player views x^e as given. In particular, the choices that he and his opponent make have a negligible effect on x^e. Thus, in making their strategic choices, players do not take into account the externalities which they generate. Their

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[4] A model in which types are not observed and signals are used to deduce the type is analyzed by Frank (1987). Robson (1990) considers a case of partial observability where each type is recognizable only by players of the same type (secret handshake).

aggregate choices, however, determine x^e.

Consider a society with a given status function $S(x_i,x^e)$. Let q be the proportion of individuals in the society with α=1 who cares about social status. We restrict our attention to symmetric equilibria where all agents of a given type choose the same strategy. We denote by $x(i,j,x^e)$ the strategy of type i when matched with type j and when he believes that the average action in the population is x^e.

Given $q\in[0,1]$, we define equilibrium as a triplet consisting of x^e, and strategies for players of type 1 and 0, $x^*(1,j,x^e)$ and $x^*(0,j,x^e)$, respectively, such that:

(i) The pair of strategies $(x^*(i,j,x^e),x^*(j,i,x^e))$ is a Nash equilibrium in a game with players of types i and j when the expected average action is x^e.

(ii) The average action x^e is consistent with the choice of actions and the distribution of types in the population. That is, the average behavior of all pairs must be consistent with the average action that each pair takes as given. Specifically,

$$
\begin{aligned}
&= q^2 x^*(1,1,x^e) + q(1-q)x^*(1,0,x^e) \\
&\quad + q(1-q)x^*(0,1,x^e) + (1-q)^2 x^*(0,0,x
\end{aligned}
\qquad \textbf{(3)}
$$

The assumptions on the function P(.,.) ensure a unique Nash equilibrium in pure strategies for a given x^e. We shall assume $\partial x^*(i,j,x^e)/\partial x^e<1$ for all $i,j\in\{0,1\}$[5]. This condition is sufficient to guarantee a unique solution for x^e in equation (3).

[5]This requirement implicitly ties the functions $P(x_i,x_j)$ and $E(x^e)$ and the status function $S(x_i,x^e)$.

For a given q, we denote by x(i,j,q) the equilibrium action of type i who is matched with type j, i.e., $x(i,j,q)=x^*(i,j,x^e)$ where x^e satisfies equation (3). The equilibrium monetary payoff of type i when matched with type j is denoted by U(i,j,q).

In the absence of social rewards, i.e., when the status function S( ) is a constant, the equilibrium is a special case of the equilibrium defined above. Applying standard arguments, this equilibrium is inefficient and provides each player with a suboptimal equilibrium payoff. To restore efficiency, one can use legal rules, subsidies or taxes. Each of these means is costly either because of direct loss of resources (e.g. jailing) or because of negative effect on incentives (dead weight loss). Our objective is to examine whether social rewards can be used as an alternative and less costly method to restore efficiency.

3. The Evolution of Preferences

Why would one care about the opinion of others? To answer this question, we consider the evolutionary formation of preferences. While most of the evolutionary game theory literature discusses the players' choice of strategy and tries to justify certain notions of equilibria, in this paper we consider the *evolution of preferences* rather than the *evolution of strategies*. That is, we assume that players play the Nash equilibrium strategies and analyze the formation of their preferences.

We follow the biological models of evolution and assume that the proportion of any type, whose expected outcome from meeting other individuals yields a better than average monetary payoff, will increase[6]. We thus define the fitness of a particular type in terms of his monetary

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[6]See Maynard Smith (1982) for the biological foundations and the surveys of economic applications by Hammerstein and Selten (1994) and Weibull (1995).

payoffs, rather than his utility which takes into account also social rewards. The underlying assumption is that even when people care about social rewards, their fitness is determined by their economic success. A possible mechanism is one in which parents spend resources to shape the preferences of their children. Wealthy parents can spend more, and are therefore more successful, in reproducing their own preferences (see Becker (1992) and Becker and Mulligan (1993).[7] Specifically, let

$$W^1(q) = qU(1,1,q) + (1-q)U(1,0,q) \qquad \textbf{(4)}$$

and

$$W^0(q) = qU(0,1,q) + (1-q)U(0,0,q) \qquad \textbf{(5)}$$

be the expected equilibrium payoffs of types 1 and 0, respectively, as functions of the distribution of types in the population. Let

$$\overline{W}(q) = qW^1(q) + (1-q)W^0(q) \qquad \textbf{(6)}$$

be the average payoff in the population. The difference $W^i(q) - \overline{W}(q)$ is a measure of the (relative) fitness of type i. By assumption, the (relative) reproduction rate of type i is increasing in his (relative) fitness. Therefore,

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[7]An alternative but probably less realistic hypothesis is that wealthy individuals have higher reproduction rates and that preferences are transmitted within families through a process of imitation (see Basu (1992)).

$$\dot{q} = \frac{dq}{dt} = q(W^1(q) - \overline{W}(q)) = q(1-q)(W^1(q) - W^0(q)) . \quad \textbf{(7)}$$

The dynamic equation (7) has rest points at q=0 and q=1. A type α_k is evolutionary stable, if when almost all members of the population are of this type then the fitness of these typical members is greater than that of any possible mutant (see Maynard Smith (1982, p.14)) . That is, given the dynamics assumed in (7), the proportion of invading mutants in the population must decline. Thus, the type α=1 is evolutionary stable if $W^1(q) > W^0(q)$ for every q close to 1. Similarly, the type α=0 is evolutionary stable if $W^1(q) < W^0(q)$ for every q close to 0.

Necessary and sufficient conditions for the evolutionary stability of type k are that for any $j \neq k$:

(i) $U(k,k,q_k) \geq U(j,k,q_k)$,

and

(ii) $U(k,j,q_k) > U(j,j,q_k)$, whenever $U(k,k,q_k)=U(j,k,q_k)$.

where q_k is close to 1 if k=1 and q_k is close to 0 if k=0.[8]

The first condition implies that k is a best reply against itself. The second condition implies that if j is doing as well as k against k, then k is doing better against j than j itself.

While we allow the composition of individual preferences to vary over time, we hold the social status function constant. That is, a society is characterized by its social status function and *all*

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[8] Observe that this formulation differs from the standard formulation in that the payoffs in a particular match depend on q. This reflects the presence of externalities. In the standard formulation conditions (i) and (ii) are independent of the distribution of types in the population.

individuals within the society, irrespective of their α, evaluate their colleagues according to this status function. A mutant cannot change the criterion according to which other members of the group evaluate him. The only dimension in which he can differ from other members is the importance he assigns to what people think about him.

4. Stable Societies

We are now ready to describe the sustainable preference profiles which are induced by alternative social status functions.

Proposition 1: (i) A social status function, $S(x_i,x^e)$, supports an evolutionary stable equilibrium in which all individuals are socially minded (i.e., with α=1), provided that it is moderately increasing in x_i (i.e., $S_1(x_i,x^e) >0$ and $\text{Sup}\,|S_1(x_i,x^e)|$ is sufficiently small). (ii) For the same $S(x_i,x^e)$, a society where all individuals are a-social (i.e., with α=0), is not evolutionary stable.

Proof: For a given q, consider the equilibrium actions for each combination of types, i.e., x(1,1,q), x(1,0,q), x(0,1,q) and x(0,0,q), and the value of the direct payoffs $P(x_i,x_j)$ evaluated at these points. For a status function, $S(x_i,x^e)$, which is moderately increasing, we can take the distance between (x(1,1,q),x(1,1,q)) and (x(0,1,q),x(1,0,q)) to be infinitesimal for every q and write

$$
\begin{aligned}
(1,1,q),x(1,1,q)) &= P(x(0,1,q),x(1,0,q)) \\
&+ P_1(x(0,1,q),x(1,0,q))(x(1,1,q)-x(0,1,q)) \\
&+ P_2(x(0,1,q),x(1,0,q))(x(1,1,q)-x(1,0,q)
\end{aligned}
\qquad \textbf{(8)}
$$

Because of the multiplicative form of equation (1) and the additive form of equation (2), the type $\alpha = 0$ who is not interested in status will choose an action x which maximizes $P(x,x(1,0,q))$. Therefore, the first partial derivative with respect to his own action must be zero. This implies that $P_1(x(0,1,q),x(1,0,q)) = 0$. Under the assumption that $S(x_i,x^e)$ is increasing in x_i, the a-social individual will choose a lower x than a socially minded individual (his reaction curve is lower). Therefore, if the actions are complementary, $P_2(x(0,1,q),x(1,0,q))$ is positive and $x(1,0,q) < x(1,1,q)$. Conversely, if the two actions are competing, $P_2(x(0,1,q),x(1,0,q))$ is negative and $x(1,0,q) > x(1,1,q)$. In either case, $P(x(1,1,q),x(1,1,q)) > P(x(0,1,q),x(1,0,q))$ for all q. Multiplying both terms by the common externality factor $E(x^e)$ yields $U(1,1,q) > U(0,1,q)$ for all q. Therefore, the fitness of a the a-social individual is lower than that of a socially minded individual (i.e., $W^1(q) > W^0(q)$) for q close to 1). Hence, a society consisting only type 1 individuals is evolutionary stable.

By a similar argument it can be shown that for a moderately increasing status function $S(x_i,x^e)$, $P(x(1,0,q),x(0,1,q)) > P(x(0,0,q),x(0,0,q))$ for all q, which implies that type 0 cannot survive in the long run. ■

Proposition 1 implies that individuals who maximize fitness end up, in equilibrium, with lower fitness than those who maximize another objective. The advantage of the socially minded preferences is that they induce favorable reactions by other individuals with whom one interacts. This result has already been noted in the analysis of strategic delegation (see for example Fershtman and Judd (1987)).

The observation that it is possible to have evolutionary stable preferences that differ from the maximization of fitness is also made by Bester and Guth (1994). They examine altruistic preferences, such that each player cares about his rival's payoff in pairwise interactions, and demonstrate that strategic complementarity is required for this kind of altruism to be evolutionary stable.

Note that Proposition 1 does not imply that every increasing social status function leads to an evolutionary stable society where everyone is socially minded. If the marginal social reward is too high, the socially minded individual may select an action which reduces his fitness and, although his rival is induced to act in a favorable way, the net impact on fitness can be negative.

Proposition 2. A social status function, $S(x_i,x^e)$, which is decreasing in x_i, supports an evolutionary stable equilibrium in which all individuals are *a-social* (i.e., have preferences α=0). For the same $S(x_i,x^e)$, a society where all individuals are *socially* minded (i.e., have preferences α=1) is not evolutionary stable.

Proof: Using the concavity of P(.,.), we can write

$$\begin{aligned} \ldots,0,q),x(0,1,q)) \leq\; & P(x(0,0,q),x(0,0,q)) \\ & + P_1(x(0,0,q),x(0,0,q))(x(1,0,q)-x(0,0,q \\ & + P_2(x(0,0,q),x(0,0,q))(x(0,1,q)-x(0,0,\ldots \end{aligned} \tag{9}$$

Since individuals who do not care about status maximize their fitness, the partial derivative of their payoff function with respect to the first argument, evaluated at the point (x(0,0,q),x(0,0,q)) must be zero. If the two actions are complementary, the derivative with respect to the second argument is positive. Because status has a negative impact on the action chosen by type 1 individuals (his reaction curve is lower), strategic complementarity implies that x(0,1,q) < x(0,0,q).

Conversely, if the two actions are competing, then x(0,1,q) > x(0,0,q) and the derivative with respect to the second argument is negative. In either case, (9) implies that for all q P(x(1,0,q),x(0,1,q)) < P(x(0,0,q),x(0,0,q)). Multiplying both expressions by the common externality factor $E(x^e)$, we obtain that if type 1 individual is matched with type 0 then his payoff is lower than that of a type 0 who is matched with type 0. Therefore, a socially minded individual (with α=1) cannot survive in a society where most people are a-social (with α=0) .

A similar argument, using again the concavity of the function P(.,.), implies that P(x(1,1,q), x(1,1,q)) < P(x(0,1,q),x(1,0,q)) for all q. Therefore, a type 0 who invades a society consisting mostly of type 1 individuals will have higher fitness than that of typical member of the society and multiply. Hence, a society consisting of only type 1 players is evolutionary unstable. ■

Figures 1 and 2 can provide some intuition for the above propositions. In Figure 1 (which corresponds to Proposition 2) we present the direct payoff of a player type j as a function of his action taking into account the reaction of a type 0 rival denoted by $R_0(x)$. The direct payoff is given by $P(x,R_0(x))$ and its slope is $P_1(x,R_0(x))+R_0'(x)P_2(x,R_0(x))$. Point a on the curve corresponds to an equilibrium in which a type 0 player is matched with another player of type 0, while point b corresponds to an equilibrium in which type 1 player is matched with a player of type 0. Assuming complementary, $R_0'(x)P_2(x,R_0(x))>0$, and because player 0 maximizes P(.,.), $P_1(x,R_0(x))=0$. Hence, the equilibrium point a must be to the left of the peak. Assuming that the status function is decreasing in x_i , the player who cares about status will choose a lower action and therefore point b must be to the left of point a, indicating a lower direct payoff. Hence, as long as S(.,.) is decreasing with x_i, a player type 0 will do better than player type 1 when matched with a player type 0.

Therefore, a society consisting only of type 0 players is evolutionary stable.

Figure 2 (which corresponds to Proposition 1) describes a situation in which status has a positive effect and actions are complementary. The curve in Figure 2 represents the function $P(x,R_1(x))$, where $R_1(x)$ is the reaction function of a type 1 player. Since a type 1 player cares about status, he will select an action such that $E(x^e)P_1(.,.)+S_1(.,.) = 0$. Therefore, when two players of type 1 interact, the slope at the equilibrium point is given by $-S_1(.,.)/E(x^e) + R'(\ )P_2(.,.)$ which is positive if $S_1(.,.)$ is small and negative otherwise. These two alternatives are presented by the equilibrium points a and a', respectively. Since a player type 0 does not care about status, he will maximize $P(.,.)$. Hence, when a type 0 and a type 1 players interact, the slope at the equilibrium point is $P_2(.,.)R'(.)$. Clearly, $P_2(.,.)R'(.) > -S_1(.,.)/E(x^e) + R'(.)P_2(.,.)$. Therefore, the equilibrium points corresponding to such a meeting are b and b', respectively. As seen, if $S_1(.,.)$ is small, a type 1 does better than type 0 against type 1, and the converse is true if $S_1(.,.)$ is large. Hence, a society consisting of only type 1 players is stable if $S_1(.,.)$ is small but need not be stable if $S_1(.,.)$ is large.

5. Status and Externalities

The characterization of stable societies can help us to determine which types of externalities can be regulated by social rewards.

Proposition 3: Activities which generate positive externalities can be regulated by social rewards. Activities which generate negative externalities cannot be regulated by social rewards and require an enforcement mechanism.

Proof: These results follow from Propositions 1 and 2. If there are positive externalities, the required correction is to raise the level of the activity chosen by individuals. Awarding higher status to activities with positive externalities provides the right incentives, and moreover the outcome is evolutionary stable, because the response to social rewards increases fitness, provided that status rises only moderately with x_i. In the case of negative externalities, it is beneficial to reduce the level of activity chosen by individuals. In this case, awarding negative status to activities with negative externalities provides the right incentives. However, the outcome is not evolutionary stable, because individuals who respond to the social rewards reduce their fitness. ■

The asymmetry between positive and negative externalities is a consequence of the basic tension between private and collective interest which is built into our model. By assumption, an increase in x_i raises private payoffs, at least initially, which is conducive to fitness. In the case of negative externalities, an increase in x_i is harmful to others. A social reward mechanism will cause each person to internalize the negative impact on others and reduce the social damage. However, a person who is concerned about others will not survive and will be eventually be replaced by non caring individuals. This conflict does not arise when there are positive externalities and it is possible to counteract them without a reduction in fitness, provided that the social reward for raising x_i is not too large.

Concluding Remark.

The analysis in this paper was limited to one society with a given social reward system. We have identified a link between the social reward system, the structure of individual preferences and the legal system. In particular, social rewards can induce individuals to care about the opinion of others and, therefore, the need for enforcement is reduced. There may be, however, an "inflation of status", where too much emphasis on social status creates an environment where only those who do not care about the opinion of others survive. In this case, too, society must rely on enforcement. These considerations, combined with the option of individuals to migrate to a preferred society, can help us to understand the type of social status functions which survive and to explain the different mixture of rules and social incentives in different societies.

Our analysis was simplified by assuming that each person is engaged in a single activity. In real life individuals are involved in many activities. Some of the activities yields positive externalities while other negative externalities. Individuals that care about status receive both negative and positive feedbacks from their actions. Praise if they do the right things, contempt if they do the wrong things. The question is under what circumstances will the socially minded individuals survive against those who do not care about social rewards. The answer to this question depends on the profile of activities that individual need to choose. A society is more likely to have stable equilibrium with socially minded individuals, if most activities involve positive externalities.

In this paper we did not specify the mechanism which generate the social status function. We have also made some strong informational assumptions. In particular it was assumed that players observe the type of their opponent and individual actions are observed by all members of society.[9] These issues are left for further work.

[9] In our previous work, Fershtman and Weiss (1993), Fershtman, Murphy and Weiss (1995), Weiss and Fershtman (1992) we assumed that the actions or characteristics of an individual are estimated to be the average of the group (e.g. occupation) to which he belongs.

References.

Arrow, K.J. (1971) "Political and Economic Evaluation of Social Effects and Externalities." in Intriligator, M. (ed.) *Frontier of Quantitative Economics*, Amsterdam: North Holland.

Basu, K. (1992) "Civil Institution and Evolution" Seminar paper No. 523, Institute for International Economic Studies, Stockholm.

Becker, G. (1992) "Habits, Addictions, and Traditions" *Kyklos*, Vol 45, pp. 327-345.

Becker, G. and C. Mulligan (1993) " On the Endogenous Determination of Time Preferences" mimeo. University of Chicago.

Bester, H. and W. Guth (1994) "Is Altruism evolutionary stable?" Mimeo Tilburg University.

Bulow J. I., J.D. Geanakoplos and P.D. Klemperer, (1985) "Multimarket oligopoly: Strategic substitutes and complements" *Journal of Political Economy*, 93(3) pp.488-511.

Dekel, E. and S. Scotchmer (1994) "On the Evolution of Attitudes Towards Risk in Winner-Take-All Games" mimeo.

Elster Jon (1989) "Social Norms and Economic Theory" *Journal of Economic Perspective* Vol 4 pp.99-117.

Fershtman, C. and K. Judd (1987) "Incentive Equilibrium in Oligopoly" *American Economic Review*, December, pp. 927-940.

Fershtman, C., and Y. Weiss (1993) "Social Status, Culture and Economic Performance" *Economic Journal*, Vol 103, pp. 946-959.

Fershtman, C., K.M. Murphy and Y. Weiss (1995) "Social Status, Education and Growth" *Journal of Political Economy*, (forthcoming).

Frank, R.H. (1987) "If Homo Economicus Could Choose His Own Utility Function, Would He Want One with a Conscience?" *American Economic Review*, September, pp.593-604.

Hammerstein, P. and R. Selten (1994) "Game Theory and Evolutionary Biology," Chapter 28 in *Handbook of Game Theory with Economic Applications*, Vol 2, edited by R. J. Aumann and S. Hart, Amsterdam: Elsevier, 929-993.

Hirshleifer, J. (1980) "Privacy: Its Origin, Function, and Future" *Journal of Legal Studies*, Vol. 9, pp.649-664.

Maynard Smith, John (1982) *Evolution and the Theory of Games*, Cambridge: Cambridge University Press.

Robson, J.A. (1990) "Efficiency in Evolutionary Games: Darwin, Nash and the Secret Handshake" *Journal of Theoretical Biology*, 144, 379-396.

Robson, J.A. (1994) "The Evolution of Attitudes Towards Risk: Lottery Tickets and Relative Wealth" mimeo. University of Western Ontario.

Rogers, A.R. (1994) "Evolution of Time Preference by Natural Selection" *American Economic Review* 84, pp 460-481.

Weibull, J. W. (1995) *Evolutionary Game Theory*,

Weiss, Y. and C. Fershtman, (1992) "On the Stability of Occupational Ranking" *Rationality and Society*, April, Vol. 4, pp. 221-233.