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HEDONIC COALITION, SOCIAL CONSCIOUSNESS AND SOCIAL INSURANCE

by

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1. INTRODUCTION

Consider the problem of a self-financing social program where contributions are voluntary but whose disbursements of proceeds are based on needs. Furthermore, assume that preferences are such that every individual is better off if all were to contribute to sustain some level of the program than having no such program at all. Without appealing to reasons like pure altruism, it is often suggested that a program such as the above is unlikely to survive. The most common reason being that because payments are independent of contributions, a self-interest maximizing individual, believing his own actions have negligible effects on the overall budget of the program, would find it beneficial to "free-ride". Consequently, everyone behaving the same way would bring about the collapse of the program with the result that everyone ends up worse-off than if some level of the program is sustained. This is the classic example of the "isolation paradox" (Sen (1967))--the N-dimension extension of the "prisoners' dilemma" game (See Luce and Raiffa (1958)).

The policy implication of this game is clear. In order to survive, social programs such as the above must contain provisions for enforcements. But at the same time, enforcement costs could sometimes be prohibitively high, and consequently, enforceable social contracts in some cases may be implausible.

It is however fortunate that the situation of impasse painted above may not be as prevalent as it is made out to be. The isolation paradox is fascinating for the simple reason that although every individual in isolation is making his most-preferred self-interest-seeking move, it generates an inefficient equilibrium. But this also suggests that there exists much potential for Pareto-improvement if individuals were to collectivize their
actions through some social organizations or coalitions. And there is certainly no shortage of such coalitions in society that evolve to partially correct the market failures that are induced by isolation behavior.

Hedonic Coalition

A coalition may take the form of a subset of fishermen who collectively contribute to build a lighthouse; or a social organization (e.g., Rotary and Lion's Club) that collectively chooses to make a contribution in money or in kind to a social cause that benefits everyone; or a gun club that elects to abide by some rule and so on. But it is questionable that a coalition that is formed for the sole purpose of contributing to a public good2 can ever survive or be sustained in equilibrium. Since a public good is non-excludable in its use and hence can be freely enjoyed by everyone, there is strong incentive for any such coalition to break down. Thus, the collectivization of actions, by itself, is insufficient to overcome the isolation-paradox type of market failures.

Nevertheless, in many cases, the coalitions of the types mentioned above do survive inspite of strong coalition-breaking incentives. It is necessary, therefore, that there exists some offsetting coalition-keeping incentives. Such incentives are not difficult to motivate. We are, however, persuaded by the "hedonic coalition" concept of Drèze and Greenberg (1980) and Olson (1971) which maintains that individuals often form coalitions simply because personal preferences are normally not confined to cover only private consumption but they also extend to cover group activities as well. In such coalitions, enjoyment is not restricted to the various characteristics of the physical group-orientated activities, but more importantly, it also encompasses the desire to win friendship, respect, and prestige from just belonging to a specific coalition. For a coalition that contributes to a
social cause, the enjoyment of such social status or prestige is usually
correlated with members' economic contributions--thus giving rise to the
commonly-used phrase "socio-economic status". (See Olson (1971).)

In the presence of these coalition-keeping incentives, it is not
difficult to anticipate the possibility of a coalition equilibrium in which
members contribute more to the non-excludable public good compared to non-
members. Furthermore, in such an equilibrium, members resent non-members,
not because of envy or malevolence, but only because further Pareto-improving
equilibria could be attained if there were less non-members.

The logic behind group behavior is itself a complex but fascinating
topic. (See Olson (1971) and Schelling (1978) for excellent discussions
of the various facets of collective actions.) For our purpose, we only wish
to stress that society is generally more resilient than is often presumed.
Although market failures that are induced by isolation behavior may be
pervasive, they also often induce the evolution of societal ethics that encourage
hedonic-coalition behavior which eventually produce a more efficient equilibrium.

Social Consciousness

Furthermore, we wish to argue that the societal response to the
isolation-paradox type of market failures is not limited to those private
c coalitions mentioned earlier. At a higher level, various social institutions such
as the family, school, religious system, the press and so on, also
respond to these market failures in a significant way. Through moral suasion,
education and propaganda, individuals are often persuaded to depart from
isolation behavior and to instead behave with some degree of social consciousness:
an awareness that each individual is "not an island" but instead belongs
to a larger coalition—the society. The desired effect of such moral suasion is to induce an individual to behave \textit{as if} he belongs to a coalition or \textit{as if} his actions are correlated with others. Thus, a socially-conscious behavior is none other but an "implicit coalition" behavior and should not be misconstrued as a purely altruistic behavior that arises from an attitude of benevolence. Nor is it to be interpreted as an infinite super-game strategy (see Luce and Raiffa (1957), and Kurz (1977)) where individuals, expecting to be tied together \textit{ad infinitum} in the future, tend to forego socially harmful short-term private gains for the sake of future gains. We do not deny the relevance\textsuperscript{3} of both the altruistic and super-game behavior, but it remains desirable to abstract from these in order to bring into focus the precise meaning and implications of a socially-conscious behavior.

By our definition of a socially-conscious behavior, there is therefore a useful analogy to be drawn from the explicit-coalition behavior discussed previously. However, unlike an explicit coalition where monitoring of members' contributions is presumably feasible so that a member has the assurance that his contributions to a non-excludable public good are correlated with others within the coalition, such an assurance is absent in an implicit-coalition behavior. This poses an additional problem since without such assurance, it is highly unlikely that moral suasion by itself can successfully induce an individual to depart from his privately-optimal isolation behavior. In other words, even if moral suasion is initially successful in inducing a socially-conscious or an implicit-coalition behavior, such a behavior can hardly be sustained since the presence of strong coalition-breaking incentives that exist in an explicit-coalition behavior is even more severe in an implicit-coalition behavior. The sustainability of a socially-conscious behavior therefore also requires the presence of
some form of offsetting implicit-coalition-keeping incentives.

This leads us into the issue of social ethics. It is our belief that the social ethical codes or the social customs of a society hardly evolve at random. The accumulation of a history of past market failures that were induced by isolation behavior inadvertently affects a society's design of its ethical codes. This is perhaps best summarized in the following observation by Arrow (1974, p. 33): "Ethical codes...are to be interpreted as organizations;...[and] organizations are a means of achieving the benefits of collective action in situations in which the price system fails" (parenthesis my own).

The type of social custom that is most pertinent to the question at hand is also one which is undeniably most ubiquitous in most societies. It takes the form of conferring reputation, prestige, and 'feelings of importance' to socially-conscious actions such as bravery, community service, charitable contributions, etc.\(^5\) Furthermore, the reputation or prestige function that accompanies a socially-conscious behavior is usually inversely related to the number of socially-conscious individuals.\(^6\)

As pointed out before, it is not a random occurrence that social customs evolve to embody such a regular form of reputation structure. It will be demonstrated that this particular form of reputation structure provides the necessary implicit-coalition-keeping incentives if moral suasion is to be successful in inducing and sustaining socially-conscious behavior among a sub-set of individuals within a society. Thus, to some extent, one purpose of this paper is to provide an explanation as to why social customs prevail in nearly all societies.
Applications to Social Insurance

In the rest of the paper, we shall formalize our foregoing discussions by way of application to a specific example: the question of social insurance.

As our point of departure, we shall take as our example Varian's (1980) model of social insurance. In that paper, it was shown that redistributive taxation, besides producing the usual equity and incentive effects, can be used as a vehicle in providing social insurance. An optimal redistributive tax therefore must trade-off between these three effects.

In abstracting from the equity consideration, his optimal tax formula, which trades off between the incentive and insurance effects, turns out to provide only a minimal amount of insurance coverage and is in fact inefficient. Potential gains readily emerge with tax schedules that provide more insurance coverage and ideally, the true socially-optimal tax formula should be one that provides full insurance. However, it was argued, and correctly so, that a full-insurance tax rule is unsustainable in equilibrium because of an adverse incentive effect that arises from isolation behavior. Herein lies the classic problem of isolation paradox: if individuals are presumed to exhibit isolation or a myopic self-interest seeking behavior, then the best sustainable tax rule turns out to be the least efficient.

The main thrust of this paper is to show that although on one extreme the ideal full-insurance tax rule is unlikely to be sustained, it does not necessarily follow that the only sustainable tax schedule must lie on the other extreme where it not only provides minimal insurance coverage but which is also the most inefficient. We suggest that the presence of potential
Pareto-improving gains will induce the evolution of society's ethical codes such that they encourage hedonic-coalition behavior and also socially-conscious behavior. It will be shown, in either of these cases, how a more efficient tax rule (relative to Varian's) that provides more insurance coverage may be sustained in equilibrium.

The rest of the paper is organized as follows. In Section 2, it is shown how a hedonic-coalition could be sustained in equilibrium to support a more efficient tax rule or social-insurance scheme. In Section 3, the definition of social-consciousness is introduced as an implicit-coalition behavior. Using the concept of self-confirming-expectations equilibrium, it is then shown how an equilibrium level of social-consciousness could be sustained to support a more efficient social-insurance scheme. In both these sections, the resulting equilibria remain isolation-paradox equilibria except they are now trapped above the corner solution. Finally, some concluding remarks are gathered in Section 4.

2. COALITION AND SOCIAL INSURANCE

Consider a simple two-period economy where there is no production. There are N identical individuals where each individual $i$ ($i=1,...,N$) is endowed with an initial-period wealth, $w_i$, which he can transfer through savings, $x_i$, into the second period. Due to elements of luck, the second-period income is $(x_i + \theta_i)$ where $\theta_i$ is a random variable with $E[\theta_i] = 0$ for all $i$. Private insurance, for various reasons, is assumed non-existent so that the personal income profile, without any insurance, is $(w_i - x_i)$ in the first period and $(x_i + \theta_i)$ in the second period.

Consider now a social insurance scheme that works as follows. Suppose there are practical difficulties involved in monitoring $x_i$ so that the only
observable tax-base is the second-period income \((x_i + \theta_i)\), then any proposed tax scheme can only affect the second-period income but which will leave the first-period income intact as \(w_i - x_i\). Consider a linear\(^\text{11}\) tax scheme which allows an individual an after-tax second-period income of

\[
D + c(x_i + \theta_i)
\]

where \(D\) is a lump-sum demogrant and \((1 - c) \in [0, 1]\) is the marginal tax rate. The total tax raised is therefore \(T \equiv \sum_i (x_i + \theta_i) - [D + c(x_i + \theta_i)] = -ND + (1 - c) \sum_i (x_i + \theta_i)\). Furthermore, if \(\theta_i\) is independent across all individuals, then the law of large numbers would imply \(\sum_i \frac{\theta_i}{N} = 0\). Consequently, a self-financing tax system, i.e., \(T/N = 0\), would imply

\[
D = (1 - c)\bar{x}
\]

where \(\bar{x} = \sum_i x_i / N\) is the average contribution of the population to the tax system. Hence the parameter \(c \in [0, 1]\) completely describes the linear tax rule. With such a tax system, a typical individual's expected utility can be expressed as

\[
V \equiv U(w - x_i) + E[U((1 - c)\bar{x} + c(x_i + \theta))]
\]

where the utility function \(U\) is assumed thrice differentiable with \(U' > 0\), \(U'' < 0\), and \(U''' > 0\).\(^\text{12}\) Note also that nearly all \(i\) subscripts have been dropped because individuals are assumed to be identical not only in \(U(\cdot)\) and \(w\), but also in the distribution of luck variable; the subscript in \(x_i\) is maintained purely for the exposition of coalition behavior.

Let \(B \in [1, N]\) denote the size of a coalition. Monitoring within a coalition is assumed feasible so that an individual within a coalition has assurance of interdependence of contributions. In addition, as previously discussed in Section 1, a coalition also offers a broadly-defined collective good or activity that can only be enjoyed by members. Let \(G(B)\) therefore
denote, in utility terms, the total net enjoyment value of members from belonging to a coalition. It summarizes the enjoyment not only from the economies of scale of consumption embodied in group-oriented activities but also from the prestige from belonging to the coalition that contributes to a social cause. By this definition, $G(1) = 0$ so that an individual in isolation or outside the coalition cannot enjoy the benefit of the social good. Within the coalition, however, it is assumed $G'(B) > 0$ because of economies of scale in consumption of various group-activities and also because greater social prestige accrues to members if the coalition size and hence its contribution to the social cause increases. But $G''(B) < 0$ because of diminishing marginal utility attached to the consumption of the broadly-defined collective good.

The problem of the coalition is as follows. For any given $c$, a coalition member is assumed to choose $x_{i\epsilon B}$ to maximize the per capita utility:

$$\max_{x_{i\epsilon B}} \frac{1}{B} \left[ \sum_{i\epsilon B} (U(w - x_{i\epsilon B}) + E[U \left( \frac{(1-c)}{N} \sum_{i\epsilon B} x_i + \frac{(1-c)}{N} \sum_{i\epsilon B} x_i + c(x_{i\epsilon B} + \theta) \right)] + G(B) \right] (1)$$

The import of the $G(B)$ function will be clear in our later discussion. At the moment it does not affect the choice of $x_{i\epsilon B}$. Suppressing the subscript $i$, let $x^\beta(c) \equiv x(\beta, c)$ be the typical solution to the above problem. Then $x^\beta(c)$ must satisfy the first-order condition

$$U'(w - x^\beta(c)) = E[U \left( (1-c)x(c) + c(x^\beta(c) + \theta) \right)] \cdot [c + (1-c)\beta] (2)$$

where $\beta = B/N$, the proportion of the population belonging to the coalition, will sometimes be referred to as the size of coalition. From (2), it is readily verified\textsuperscript{13} that at $\beta = 0$, $\frac{\partial x^\beta}{\partial \beta} \bigg|_{\beta=0} > 0$ so that formation of a coalition will result in a greater contribution to the tax system. In general, it is assumed that
\[
\frac{\partial x^\beta}{\partial \beta} > 0 \quad \text{which implies} \quad \frac{\partial x^\beta}{\partial c} > 0 \quad \text{for all} \quad \beta . \tag{3}
\]

The expected utility of a typical coalition member can now be written as

\[
V^\beta = U^\beta(w - x^\beta(c)) + E[U^\beta((1-c)x(c) + c(x^\beta(c) + \theta))] + s(\beta) \tag{4}
\]

where

\[
s(\beta) \equiv G(N\beta)/N\beta \tag{5}
\]

is the per member net benefit from the collective activity of the \(\beta\)-size coalition.

Note that \(\lim_{\beta \to 1/N} s(\beta) = 0\) since \(G(1) = 0\), and \(s'(\beta) \geq 0\) and \(G' \geq G/N\beta\). It is easily verified that given the properties of \(G\), the graph of \(s(\beta)\) takes on the shape as illustrated in Figure 2.

Outside of coalition, the problem of an individual in isolation is similar to (1) except for the fact that now \(B = 1\) and \(G(1) = 0\). Now \(B = 1 \Rightarrow \beta = 1/N\).

Thus when \(N\) is large, an individual outside the coalition will behave as if \(\beta = 1/N \to 0\). His solution to problem (1) can be written as \(x^0(c) \equiv x(\beta \to 0, c)\) which satisfies the first-order condition

\[
U'(w - x^0(c)) = E[U'((1-c)x(c) + c(x^0(c) + \theta))] \cdot c \tag{6}
\]

Observe that (2) reduces to (6) when \(\beta \to 0\). While an individual in (2) behaves as if his savings significantly affects the demigrant so that his dollar's contribution is seen to yield in the second period not only \(c\) but also the demigrant effect \((1-c)\beta\), the individual outside the coalition (in (6)) disregards the demigrant impact of his contributions. Thus, because of (3), a coalition member's contribution to the overall budget generally exceeds that of a non-member, i.e., \(x^\beta(c) > x^0(c)\). The expected utility of a non-member or an individual in isolation can now be written as
\[ \psi^0 = u^0(w - x^0(c)) + E[u^0(1-c)x(c) + c(x^0(c) + \theta)]. \] (7)

We shall now proceed to calculate the optimal tax schedule given the presence of coalition behavior. Recall that a coalition member contributes \( x^\beta(c) \) whereas a non-member, \( x^0(c) \). Thus for any given \( c \), the average contribution of the population to the tax system is \( \bar{x}(c) = \beta x^\beta(c) + (1-\beta)x^0(c) \) so that the per capita demogrant implied by a self-financing redistributive tax system is

\[ D = (1-c)\bar{x}(c) = (1-c)[\beta x^\beta(c) + (1-\beta)x^0(c)]. \] (8)

The problem of the government is therefore to choose \( c \) to maximize the average (or total) utility, \( \bar{v} \), of the population:

\[
\begin{align*}
\max_c \bar{v} & \equiv \beta v^\beta(\beta,c,x^\beta(c),x^0(c)) + (1-\beta)v^0(\beta,c,x^\beta(c),x^0(c)) \\
& \equiv \beta[\mu^\beta(w - x^\beta(c)) + E[\mu^\beta((1-c)[\beta x^\beta(c) + (1-\beta)x^0(c)] + c(x^\beta(c) + \theta))]+s(\beta)] \\
& \quad + (1-\beta)[\mu^0(w-x^0(c)) + E[\mu^0((1-c)[\beta x^\beta(c) + (1-\beta)x^0(c)] + c(x^0(c) + \theta))]]
\end{align*}
\]

After using the individual first-order conditions (2) and (6), the solution is given by the necessary condition:

\[
0 = \frac{d\bar{v}}{dc} = \beta[E[u^\beta' \cdot (x^\beta - \bar{x} + \theta)] + (1-c)E[u^\beta'](1-\beta)\frac{\partial x^0}{\partial c}] \] (9)
\[
+ (1-\beta)[E[u^0' \cdot (x^0 - \bar{x} + \theta)] + (1-c)E[u^0'](\beta\frac{\partial x^\beta}{\partial c} + (1-\beta)\frac{\partial x^0}{\partial c})].
\]

Thus for any \( \beta \in (0,1) \), the optimal tax formula can be solved from (9) as

\[
c(\beta) = 1 + \frac{\beta E[u^\beta' \cdot (x^\beta - \bar{x} + \theta)] + (1-\beta)E[u^0' \cdot (x^0 - \bar{x} + \theta)]}{\beta E[u^\beta'](1-\beta)\frac{\partial x^\beta}{\partial c} + (1-\beta)E[u^0'](\beta\frac{\partial x^\beta}{\partial c} + (1-\beta)\frac{\partial x^0}{\partial c})]}
\] (10)

The optimal tax formula therefore depends on the coalition size \( \beta \).

We shall now consider two extreme cases. On the one extreme when there is no coalition, \( \beta = 1/N \to 0 \). This implies \( \bar{x} \to x^0 \); consequently the optimal tax formula, after using (6), reduces to
\[
c(\beta \to 0) = \frac{U^o'(w-x^o)\partial x^o/\partial c}{U^o'(w-x^o)\partial x^o/\partial c - E[U^o' \cdot \theta]}
\]

(11)

This is exactly the formula obtained by Varian. The term \(E[U^o' \cdot \theta]\), given \(E[\theta] = 0\), is simply the covariance between marginal utility and income, and it is negative because \(U'' < 0\). Furthermore, it is easily derived (from (6)) that \(\partial x^o/\partial c > 0\) because \(U''' > 0\). Hence \(c(\beta \to 0)\) lies between 0 and 1, which implies the tax rule offers only partial insurance coverage since not all second-period risk is eliminated.

On the other extreme when the whole population belongs to the coalition, \(\beta = 1\). In this case \(\bar{x} = x^\beta\) and the derivative \(\frac{d\bar{V}}{dc}\) on the R.H.S. of (9) reduces to

\[
\frac{d\bar{V}}{dc} \bigg|_{\beta = 1} = E[U^\beta' \cdot \theta] < 0 \quad \text{for all } c \in [0,1].
\]

Hence the optimal \(c\) must be pushed to its lowest permissible value, i.e.,

\[
c(\beta = 1) = 0.16
\]

(12)

This formula offers full-insurance coverage since when \(c = 0\) the second-period income reduces to the fixed demogrant \(D\); consequently all risk is eliminated. Furthermore, the full-insurance scheme is also socially-optimal. (See also Varian (1980).)

In summary, we have shown that the optimal tax rule or the optimal degree of social-insurance coverage depends strictly on the coalition size. Also, among the infinite number of tax rules, some are obviously more desirable than others. However, it remains to be shown that the most appropriate social-insurance scheme to follow is also one that is attainable. This obviously depends on the coalition size that may be sustained in equilibrium.

We now turn to examine this question.
Equilibrium Coalition

Given the optimal tax rule \( c(\beta) \), the expected utility of a coalition member can now be expressed as

\[
V^\beta(\beta, c(\beta), x^\beta(c(\beta)), x^0(c(\beta))) = \hat{V}^\beta(\beta, c(\beta), x^\beta(c(\beta)), x^0(c(\beta))) + s(\beta) \tag{13}
\]

where

\[
\hat{V}^\beta(\beta, c(\beta), x^\beta(c(\beta)), x^0(c(\beta))) = U^\beta(w - x^\beta(c(\beta))) + E[U^\beta((1-c(\beta))[\hat{p}x^\beta(c(\beta)) + (1-\beta)x^0(c(\beta)))] + c(\beta)[x^\beta(c(\beta)) + \theta] \tag{14}
\]

is the enjoyment for private consumption and \( s(\beta) \) is the enjoyment from the collective activity of a coalition. For an individual in isolation, his expected utility is

\[
V^0(\beta, c(\beta), x^\beta(c(\beta)), x^0(c(\beta))) = U^0(w - x^0(c(\beta))) + E[U^0((1-c(\beta))[\hat{p}x^\beta(c(\beta)) + (1-\beta)x^0(c(\beta)))] + c(\beta)[x^\beta(c(\beta)) + \theta] \tag{15}
\]

Let \( \beta^* \) be an equilibrium coalition, then it is necessary that, with free entry, the expected utilities are equalized between a non-member and a member of the coalition, i.e.,

\[
\hat{V}^{\beta^*}(\beta^*, c(\beta^*), x^{\beta^*}(c(\beta^*)), x^0(c(\beta^*))) + s(\beta^*) = V^0(\beta^*, c(\beta^*), x^{\beta^*}(c(\beta^*)), x^0(c(\beta^*))) \tag{16}
\]

Otherwise, there exists incentives for individuals to enter or exit the coalition which in turn would affect the coalition size.

A natural candidate is of course \( \beta \to 0 \), i.e., the case of no coalition so that the optimal tax is \( c(\beta \to 0) \). If there are no other candidates of \( \beta \) that satisfy (16), then \( c(\beta \to 0) \) is the only sustainable tax schedule. However, it shall be shown that other candidates of \( \beta \) exist that not only satisfy (16) but which also dominate \( \beta \to 0 \).
This result will become apparent once we consider the properties of the $V^\beta$ and $V^o$ functions. Consider first the function $V^\beta = \hat{V}^\beta + s(\beta)$. Ignoring $s(\beta)$ for the moment, the properties of the component $\hat{V}^\beta$ (enjoyment from private consumption) are shown in Appendix I and illustrated in Figure 1. Starting from the left, it rises monotonically, with an initial slope of zero, and ending on the right with a positive slope. The reason for this is that starting at the point of no coalition, a marginal increase in coalition size hardly affects the demogram size and the optimal tax schedule so that expected utility is hardly affected. On the other hand, at the point where coalition size $\beta = 1$, a marginal decrease in coalition size will decrease expected utility because a reduction in contribution to the tax system significantly reduces the demogram size.

Consider next the function $V^o$ whose properties (derived in Appendix II) are also shown in Figure 1. Like $\hat{V}^\beta$, it rises monotonically with an initial slope of zero and ending at the right with a positive slope.

In Figure 1, observe also that except at $\beta \to 0$, $\hat{V}^\beta$ is everywhere below $V^o$. The reason for this is obvious once we recall that $(1-\alpha)[x^\beta + (1-\beta)x^o] \equiv D$ in (14) and (15) is the lump-sum demogram (which can be viewed as a public good) common to every individual regardless of how much he contributes. Thus the privately-optimal behavior is one which takes $D$ to be independent of contributions. This behavior is essentially that of a non-member who, in contributing $x^o$ according to (6), takes $D$ to be a constant. A coalition member, however, deviates from this privately-optimal behavior since his contributions of $x^\beta$ according to (2) is derived from considering $D$ to be affected by his contributions. Consequently a coalition member can be said to be contributing more than is necessary to the social program.
Figure 1

$V^O(\beta, c(\beta), x^\beta(c(\beta)), x^O(c(\beta)))$

$\hat{V}^\beta(\beta, c(\beta), x^\beta(c(\beta)), x^O(c(\beta)))$
Thus without gaining any enjoyment \( s(\beta) \) from being in a coalition, it is clear from Figure 1 that the only equilibrium coalition is one where \( \beta \to 0 \), i.e., no coalition is viable with the result that the only sustainable tax rule is \( c(\beta \to 0) \). The reason is simply that private expected utility can be improved by opting out of the coalition since non-members can always enjoy freely the additional contributions to the demogrant by coalition members.

To have a viable equilibrium coalition other than \( \beta \to 0 \), it is apparent that a coalition must offer membership an enjoyment \( s(\beta) \) from the coalition activity other than private consumption. With this, the coalition member's expected utility \( V^\beta = \hat{V}^\beta + s(\beta) \) is seen in Figure 2 to intersect \( V^O \) at \( E^* \). The equilibrium coalition \( \beta^* \) is not only stable, but it also dominates \( \beta \to 0 \).

Stability arises from the fact that \( V^O \) has an initial slope of zero but \( V^\beta = \hat{V}^\beta + s(\beta) \) rises initially with a positive slope (because \( s'(\beta) > 0 \) at \( \beta \to 0 \)). Consequently \( V^\beta \) must intersect \( V^O \) from the above. This implies that whenever \( \beta > \beta^* \), we have \( V^O > V^\beta \) so that incentives exist to switch out of the coalition; thus making the coalition size shrinks toward \( \beta^* \). Conversely, whenever \( \beta < \beta^* \), we have \( V^\beta > V^O \) which induces entry into the coalition; consequently the coalition size increases toward \( \beta^* \).

That \( \beta^* \) is more efficient than \( \beta \to 0 \) is transparent. The average (or total) expected utility of the population \( \bar{V} = \beta V^\beta + (1-\beta)V^O \), given by the dotted curve, is higher at \( E^* \). However, this curve may still be rising at \( E^* \), indicating that there exists coalition sizes that are potentially more efficient than \( \beta^* \). They are, of course, unsustainable in equilibrium. Thus our equilibrium \( \beta^* \), which supports the tax schedule \( c(\beta^*) \), remains an isolation-paradox equilibrium except that it is now trapped above the corner.
solution \( \beta \rightarrow 0 \).

A few remarks are in order. It is not generally the case that coalition behavior will always produce a unique and stable equilibrium like \( \beta^* \) for all types of isolation-paradox problems. Depending on the nature of the problem, the type of public good (e.g., lumpy or continuous) involved, and the cost structure associated with a coalition, etc., there are a large variety of configurations that curves like \( V^0 \) and \( V^{\beta} \) could take with the consequence that different types of equilibria are possible. In some cases, the corner solution \( \beta \rightarrow 0 \) is the only stable equilibrium;\(^{17}\) in some a unique and stable equilibria like \( \beta^* \) is possible; yet in others there are possibilities of multiple equilibria (see for example Schelling (1978)).

3. SOCIAL CONSCIOUSNESS AND SOCIAL INSURANCE

As pointed out in section 1, the response to market failures that result from isolation behavior is not limited to explicit coalition formation. At a higher level, society as a whole is more resilient to these types of problems than we wish to admit especially in conventional economic analysis. Through its social institutions such as the family, school, religious system, the press and so on, there is no lack of moral suasion whose desired effect is to induce individuals to depart from isolation behavior and to behave instead in a more socially-conscious manner, i.e., behaving as if one belongs to a coalition. In this respect, a socially-conscious behavior is essentially an "implicit coalition" behavior. As a consequence, the analysis of coalition behavior provides a useful analogy for our present discussion.
Consider an individual who is being induced, through moral suasion, to behave as if he belongs to a coalition size \( B \in [1, N] \). Then drawing from the analogy of an explicit-coalition behavior, his contribution, for any given \( c \), would be \( x^B(c) \) that satisfies the same first-order condition (2). This is rewritten as

\[
U'(w - x^B(c)) = E[U'(D + c(x^B + \theta))][c + (1-c)\beta]
\]  
\[ (17) \]

The parameter \( \beta = B/N \), however, will now be interpreted as the implicit-coalition or the expected coalition size. It represents the individual's expectation (induced by moral suasion) of the proportion of the population who would behave as he does and hence it reflects his expectation of the degree of correlation between his and others' actions. We shall henceforth call \( \beta \) the degree of social-consciousness. Let the proportion of the population who are persuaded to behave with \( \beta \) level of social-consciousness be \( k \in [0,1] \). The proportion \((1-k)\) will then be those who are not persuaded so that they continue to behave in isolation or with a zero degree of social consciousness. A typical individual of the latter group will contribute \( x^0(c) \) which satisfies the same first-order condition (6) which is rewritten as

\[
U'(w - x^0(c)) = E[U'(D + c(x^0 + \theta))][c]
\]  
\[ (18) \]

As before, the demogram \( D \) is common to every individual regardless of how much he contributes. Thus, behaving according to (18), which views \( D \) to be unaffected by individual contributions, is privately-optimal. Behavior (17), however, which calls for an individual to contribute \( x^B \) more than it is privately-optimal \( x^0 \) is therefore privately sub-optimal for an individual. That is why moral suasion by itself was before argued to be insufficient to successfully induce a behavior like (17) unless it is augmented by some social customs. This will be discussed shortly.
Meantime, notice that since $k$ is the proportion of individuals who behave according to $\beta$ and $(1-k)$ is the proportion of individuals who behave as if $\beta \to 0$, then a self-financing redistributive tax structure must require that the per capita demogrant

$$D = (1-c)x = (1-c)[kx^\beta(c) + (1-k)x^\delta(c)]$$

The expected utility of a socially-conscious individual can then be expressed as

$$V^\beta(k,c,x^\beta(c),x^\delta(c)) = \hat{V}^\beta(\beta,c,x^\beta(c),x^\delta(c)) + R(\beta,k) = U^\beta(w-x^\beta(c)) + E[U^\beta((1-c)[kx^\beta(c) + (1-k)x^\delta(c)]) + c[x^\beta(c) + \theta]) + R(\beta,k)$$

which consists of two components: $\hat{V}^\beta \equiv \{U^\beta(\cdot) + E[U^\beta(\cdot)]\}$ and $R(\beta,k)$. Following our discussion in Section 1, $R(\beta,k)$ is the 'reputation' or 'prestige' function which accompanies a socially-conscious behavior. It usually has the properties:

$$\begin{cases} R(\beta,k) \geq 0; R(0,k) = R(\beta,1) = 0 & \forall k, \beta \\ \frac{\partial R(\beta,k)}{\partial \beta} > 0 & \forall k \in [0,1); \frac{\partial R(\beta,k)}{\partial k} < 0 & \forall \beta \in (0,1] \end{cases}$$

This says that an individual derives no reputation if he behaves with zero degree of social-consciousness (i.e., $R(0,k) = 0$). For any given $k$, the reputational value of course increases with the degree of socially-conscious behavior (i.e., $\partial R(\beta,k)/\partial \beta > 0$). But for any $\beta$, the reputational value decreases with the proportion of the population, $k$, who behave according to $\beta$ (i.e., $\partial R(\beta,k)/\partial k < 0$); and in the limit when everyone also behaves according to $\beta$ (i.e., $k=1$), then the reputational value also vanishes (i.e., $R(\beta,1) = 0$). This reputational structure underscores the importance which an individual attaches to his relative socio-economic status in society. Its exact form may vary from one society to another, but, nevertheless, its general properties
defined by (21) seem to be a reasonable characterization for most of the social customs we observe.

On the other hand, the expected utility of a non-socially-conscious individual can be simply expressed as

\[
V^0(k, c, x^\beta(c), x^0(c)) = U^0(w - x^0(c)) + E[U^0((1-c)[kx^\beta(c) + (1-k)x^0(c)]
+ c[x^0(c) + \theta])]
\]

(22)

Given the above, we can now proceed to calculate the optimal tax schedule. The government's problem is simply to choose \( c \) to maximize the average (or total) utility of the population: \( \max \bar{V} = kV^\beta(k, c, x^\beta(c), x^0(c)) + (1-k)V^0(k, c, x^\beta(c), x^0(c)) \). Using the definitions of \( V^\beta \) and \( V^0 \) in (20) and (22) respectively and also the individual first-order conditions (17) and (18), the solution to the above problem must satisfy:

\[
0 = \frac{d\bar{V}}{dc} = k[E[U^\beta' \cdot (x^\beta - \bar{x} + \theta)] + (1-c)E[U^\beta' \cdot (k-\beta) \frac{\partial x^\beta}{\partial c} + (1-k) \frac{\partial x^0}{\partial c}]
+ (1-k)[E[U^0' \cdot (x^0 - \bar{x} + \theta)] + (1-c)E[U^0' \cdot [k \frac{\partial x^\beta}{\partial c} + (1-k) \frac{\partial x^0}{\partial c}]]
\]

From this, the optimal tax formula can now be conveniently expressed as

\[
c(\beta, k) = 1 + \frac{kE[U^\beta' \cdot (x^\beta - \bar{x} + \theta)] + (1-k)E[U^0' \cdot (x^0 - \bar{x} + \theta)]}{kE[U^\beta' \cdot (k-\beta) \frac{\partial x^\beta}{\partial c} + (1-k) \frac{\partial x^0}{\partial c}] + (1-k)E[U^0' \cdot [k \frac{\partial x^\beta}{\partial c} + (1-k) \frac{\partial x^0}{\partial c}]}
\]

(23)

which now depends on two arguments: \( \beta \) and \( k \).

It is easily seen that formula (23) encompasses (10) as a special case. In particular,

\[
c(\beta, \beta) = c(\beta) = c(k) = c(k, k) \quad \text{if } k = \beta
\]

(24)

This comes as no surprise since the degree of social consciousness \( \beta \) is nothing but the expected (or the implicit) coalition size. Thus if \( k = \beta \), which implies the actual being equal to the expected coalition size, then the resulting socially-conscious behavior should give rise to an optimal \( c(\beta, k=\beta) \).
schedule which is exactly the same as the schedule $c(\beta)$ which arises from the explicit coalition behavior. Furthermore, (23) also reduces to (11) whenever $k = 0$, i.e., $c(\beta, k=0) = c(\beta \to 0)$.

The optimal tax formula, however, is merely a normative statement of how $c$ is affected by $\beta$ and $k$. Which tax schedule is sustainable obviously depends on the sizes of $k$ and $\beta$ that may be supported in equilibrium.

**Equilibrium** $k$

As before, the necessary condition for equilibrium requires that expected utilities be equalized between those who behave according to $\beta$ and those who behave as if $\beta \to 0$:

$$
\hat{V}^\beta(\beta, c(\beta, k), x^\beta(c(\beta, k)), x^o(c(\beta, k))) + R(\beta, k) = V^o(\beta, c(\beta, k), x^\beta(c(\beta, k)), x^o(c(\beta, k)))
$$

(25)

The model is obviously under-determined since the single equilibrium condition (25) is asked to solve for both values of $\beta$ and $k$. There are, however, two natural ways of introducing another condition (equation) to close the model. Firstly, we can assume the degree of social-consciousness $\beta = \bar{\beta}$ where $\bar{\beta}$ is exogenously determined by the dosage of moral suasion; then equilibrium $k^*$ would solve equation (25). This approach, however, could only induce a short-run or myopic equilibrium since in the event that equilibrium $k^* \neq \bar{\beta}$, it implies those socially-conscious individuals continue to hold the wrong expectations about the implicit-coalition size.\(^{18}\) Such a situation cannot persist since revision of expectations is expected to take place until $k = \beta$. In what follows, we shall close the model with $k = \beta$ so that the equilibrium that ensues is that of the long-run or self-confirming-expectations equilibrium.
Substituting (24) into (25), the self-confirming-expectations equilibrium condition can now be expressed as

\[ \hat{V}^k (k, c(k), x^k (c(k)), x^0 (c(k))) + r(k) = V^0 (k, c(k), x^k (c(k)), x^0 (c(k))) \] (26)

where \( r(k) \equiv R(k, k) \).

The properties of the function \( R(\cdot, \cdot) \) as expressed in (21) immediately imply the properties for \( r(k) \):

\[
\begin{cases}
    r(k) \geq 0; & r(0) = r(1) = 0 \\
    \left. \frac{dr}{dk} \right|_{k=0} > 0; & \left. \frac{dr}{dk} \right|_{k=1} < 0
\end{cases}
\] (27)

Special attention should be noted that \( r(k) \), as graphed in Figure 3, rises with a positive slope at the point \( k = 0 \).

The nature of equilibrium as expressed in (26) will now be characterized. To begin with, note that the functions \( \hat{V}^k (k, c(k), \ldots) \) and \( V^0 (k, c(k), \ldots) \) in (26) are exactly identical to \( \hat{V}^\beta (\beta, c(\beta), \ldots) \) in (14) and \( V^0 (\beta, c(\beta), \ldots) \) in (15) respectively. Thus the graphs of \( \hat{V}^k \) and \( V^0 \) in Figure 3 are identical to \( \hat{V}^\beta \) and \( V^0 \) in Figure 1. In particular, both \( \hat{V}^k \) and \( V^0 \) rise with an initial slope of zero. Now because \( r(k) \) rises with a positive slope at \( k = 0 \), the function \( V^k \equiv \hat{V}^k + r(k) \) must intersect \( V^0 \) at \( E^{**} \) from the above. Consequently the equilibrium level of social-consciousness \( k^{**} \) is stable, which means that the optimal tax schedule \( c(k^{**}) \) is sustainable.

It should again be emphasized that although the equilibrium level of social-consciousness \( k^{**} \) is more efficient than \( k = 0 \), it remains an isolation-paradox equilibrium. The reason is the average (or total) expected utility \( \bar{V} \) of the population, indicated by the dotted curve, may still be rising at \( E^{**} \). Consequently, there exists higher levels of \( k \) which are potentially more efficient (albeit unsustainable) than \( k^{**} \). A further implication of this is
Figure 3
that those who are socially-conscious resent those who are not, since Pareto improvements are possible if the equilibrium level of social-consciousness were to be higher than k**.

4. CONCLUSION

The problem of isolation paradox pervades many areas of economic life. Its fascination is that although individuals are making their most-preferred self-interest-seeking moves, the resulting equilibrium turns out to be inefficient. The view taken in this paper is that society is often quite resilient to this type of market failure. We maintain that social ethical codes by no means evolve at random. Rather, ethical structures are often designed for the purpose of inducing a departure from isolation behavior so that a more efficient equilibrium can be produced.

In general, the system of ethical codes is often complex and wide-ranging. We are, however, concerned mainly with the ethical structure that causes individuals' preferences to be affected not only by private consumption alone, but also by the social prestige that goes with contributing to a socially-beneficial activity. It is this tradeoff between private consumption and socioeconomic status that underlies the heart of our analysis.

In the explicit hedonic-coalition example, monitoring of members' contributions is presumed feasible so that the assurance of correlation between members' contributions provides the necessary condition for the greater contributions of members compared to non-members. However, assurance is only necessary but not sufficient in sustaining an equilibrium coalition unless it is augmented by social ethics that encourage the tradeoff between private and social consumption.

Similarly, moral suasion, on the part of various social organization--like the family, school, religious system, the press, etc.--can only play the role of persuasion or assurance that individual actions are correlated. While it is necessary to induce a socially-conscious or implicit-coalition
behavior, it is not sufficient in sustaining an equilibrium which exhibits any degree of social-consciousness unless it is augmented by social ethics.

The equilibrium that is generated from either the explicit- or implicit-coalition obviously dominates the isolation-behavior equilibrium. However, it is generally the case that it remains an isolation-paradox equilibrium except that it is now trapped above the corner solution. The reason is there still exists a potential for Pareto-improvement if the equilibrium coalition size (in the case of explicit-coalition) or the degree of social-consciousness (in the case of implicit-coalition) is greater than it is. For this reason also, it is typically the case that those who belong to the coalition or those who are socially-conscious often resent those who are not.
Appendix I: Properties of the Function $Y^β(β, c(β), x^β(c(β)), x^0(c/β))$

From (14), the derivative $dY^β/dβ$, after using type-β individual's first-order condition (2), is given by

$$\frac{dY^β}{dβ} = E[U^β](1-c)(x^β-x^0) + \frac{∂c}{∂β}[E[U^β] + E[U^β](x^β-x) + E[U^β](1-c)(1-β)\frac{∂x^0}{∂c}] \quad A(1)$$

A change in coalition size $β$ affects a member's expected utility by way of the following effects. Firstly, it changes the demigrant size and hence we have the direct demigrant effect (i). Secondly, it affects the optimal tax $c$ which in turn produces the insurance effect (ii); the redistributive effect (iii) from a member to a non-member of the coalition; and the disincentive effect on non-members' contributions (iv) which indirectly affects the demigrant size.

On one extreme when $β \to 0$, we have $x^β \to x^0$ and $x \to x^0$, so that the direct demigrant effect (i) and the redistributive effects (iii) vanish. This leaves the insurance effect (ii) and the disincentive effect (iv) which turn out to exactly offset each other because of the optimal tax formula (11). Hence

$$\frac{dY^β}{dβ} \bigg|_{β=0} = 0 \quad A(2)$$

At the point where there is no coalition, a marginal increase in coalition size hardly affects the demigrant size and the optimal tax schedule, and hence it causes no change in expected utility.

On the other extreme when $β = 1$, we have $x^β = \bar{x}$, so that the redistributive effect (iii) and the disincentive effect (iv) on non-members' contributions vanish. This is expected since everyone is now a member of the coalition. Furthermore, the insurance effect (ii) also vanishes since $\frac{∂c}{∂β}\bigg|_{β=1} = 0$ (from footnote 16). Hence
\[ \frac{d \hat{v}^\beta}{d \beta} \bigg|_{\beta=1} = E[U^\beta'](x^\beta-x^0) > 0 \quad \text{(A3)} \]

which says that at \( \beta = 1 \), a marginal decrease in coalition size significantly reduces a member's expected utility because of the \textit{direct demogrant effect (i)}. In general, for \( \beta \) between 0 and 1, the sign of \( \frac{d \hat{v}^\beta}{d \beta} \) is difficult to establish. However, for the type of qualitative results that we eventually seek to demonstrate, it is not awfully restrictive to assume that \( \hat{v}^\beta \), which has a slope of zero at \( \beta \to 0 \) and a positive slope at \( \beta = 1 \), to be monotonically rising between these two end-points (see Figure 1).
Appendix II: Properties of the \( V^0(\beta, c(\beta), \bar{x}^\beta(c(\beta)), \bar{x}^0(c(\beta)) \) Function

From (15), the derivative \( dV^0/d\beta \), after using the non-member's first-order condition (6), is given by

\[
\begin{align*}
\frac{dV^0}{d\beta} &= E[U_0'](1-c)[(x^\beta-x^0)+\beta \frac{\partial x^\beta}{\partial \beta}] + \frac{\partial c}{\partial \beta}(E[U_0'](1-c)(\beta \frac{\partial x^\beta}{\partial c} + (1-\beta) \frac{\partial x^0}{\partial c}))
\end{align*}
\]

A(4)

The effect of a change in \( \beta \) on a non-member's expected utility can also be decomposed into four terms. Firstly, we have the direct demogrant effect (i). Secondly, a change in \( \beta \) affects the optimal tax \( c \) which in turn induces the insurance effect (ii), the redistributive effect (iii) from a member to a non-member, and the disincentive effect (iv) to save by both groups.

On one extreme when \( \beta \to 0 \), we have \( x^\beta \to x^0 \) and \( \bar{x} \to \bar{x}^0 \), so that the direct demogrant effect (i) and the redistributive effect (iii) vanish. This leaves the insurance effect (ii) and the disincentive effect (iv) which exactly offset each other because of the optimal tax formula (11). Thus

\[
\frac{dV^0}{d\beta} \bigg|_{\beta=0} = 0
\]

A(5)

On the other extreme when \( \beta = 1 \), we have \( c(\beta=1) = 0 \) and also (from footnote 16)

\[
\frac{\partial c}{\partial \beta} \bigg|_{\beta=1} = 0,
\]

so that A(4) reduces to

\[
\frac{dV^0}{d\beta} \bigg|_{\beta=1} = E[U_0'][(x^\beta-x^0) + \beta \frac{\partial x^\beta}{\partial \beta}] > 0
\]

A(6)

Again, we find that the \( V^0 \) has a zero slope on one end where \( \beta \to 0 \) and a positive slope at the opposite end where \( \beta = 1 \). For \( \beta \) between these two end-points, it will be assumed that \( V^0 \) rises monotonically.
Footnotes

1 See Baumol (1952), Sen ((1961),(1967)), and Marglin (1963) regarding the discussions of enforceable social contracts on the issues of taxation, collective savings, etc.

2 A public good is defined broadly as any activity that involves externalities and which is non-excludable in its use. A coalition of course may be formed for all sorts of reasons but our emphasis here is on those coalitions that are formed to counteract the market failures (or the inefficiency in the supply of public goods) that are induced by isolation behavior.

3 The attitude of benevolence is clearly more relevant in a close family setting than anything else. Also, the super-game behavior is not without problems: It collapses when the future periods, which tie individuals together, is finite (see, for example, Kurz (1977)).

4 In the context of social savings and investment (Sen (1967), Marglin (1963), and Baumol (1952)) and philanthropy (Vickrey (1962)), it is implied that individuals would contribute more if there is assurance that their actions are correlated. It shall be shown, however, that although assurance is necessary in inducing a departure from isolation behavior, it is not sufficient in sustaining such behavior for long unless it is augmented by some coalition-keeping incentives.

5 It is equally the case that social ethics often confers 'guilt feelings' on non-socially-conscious behavior such as cheating, shirking, littering, etc. This aspect, however, is not required in our analysis although its inclusion will obviously strengthen our results.
Prestige, reputation, respect, and heroism are basically 'relative' concepts. An individual, for instance, gains the highest degree of reputation when he alone is singled out as a hero. And heroism quickly wanes when it becomes more common and spread out among others.

The analysis in this paper can be adapted to a broad range of questions; social insurance is taken up only as an example of application.

This assumption is utilized in order to abstract from the redistributive effect of a tax system.

For example, returns to scale, moral hazard, adverse selection, etc.

Notice that if the first-period variables were observable, then there would be no difficulties of monitoring $x_i$ in which case the problem of isolation paradox will never arise.

Varian (1980) considered both the linear and non-linear redistributive tax systems. For our purpose, we shall focus only on the linear tax schedule since our only interest is to use social insurance as an example to apply our concepts of coalition and social consciousness.

The assumption $U'' > 0$ implies the desired property (see Arrow (1970)) that the absolute risk aversion factor is decreasing.

Defining $\gamma \equiv \{c + (1-c)\beta\} > 0$, it is easily derived from (2) that

$$\frac{\partial x_{\beta}}{\partial \beta} = - \frac{(1-c)}{U'' + \gamma^2 E[U']} \left[ E[U'] + \gamma E[U''](x^\beta - x^0) \right]$$

so that at $\beta = 0$, $x^\beta = x^0$ and $\frac{\partial x_{\beta}}{\partial \beta} \bigg|_{\beta=0} > 0$. Furthermore

$$\frac{\partial x_{\beta}}{\partial c} = - \frac{\gamma E[U'' \cdot \theta]}{U'' + \gamma^2 E[U']} + \frac{(1-\beta)}{(1-c)} \frac{\partial x_{\beta}}{\partial \beta} .$$

Hence if $\frac{\partial x_{\beta}}{\partial \beta} > 0$ then $\frac{\partial x_{\beta}}{\partial c} > 0$ since $U'' > 0 \Rightarrow E[U'' \cdot \theta] > 0$.
14 See footnote 13.

15 Appropriately, $V^\beta$ should be written without the superscript $\beta$ being attached to the utility function $U$ since all individuals are assumed to have the same utility function. However, we have chosen to attach a superscript $\beta$ to the function $U$ in order to bring out the fact that the value of welfare depends on the contribution $x$. Thus an individual who, for instance, contributes $x^0$ will have a welfare value of $V^0 = U^0(1-x^0) + E[U^0((1-c)x + c(x^0+\theta))] = U(w-x^0) + E[U((1-c)x + c(x^0+\theta))].$

16 According to formula (10), notice that if $\beta = 1$ then $c(\beta=1) = 1 - \infty$ which is a large negative number. But because of the restriction that $c \in [0,1]$, the solution $c(\beta=1) = 0$ in (12) is just corner solution. It therefore follows that, because of the continuity of $c(\beta)$, there must exist an interval $\delta$ (where $1 > \delta > 0$) such that for $\beta \in [1-\delta,1]$, $c(\beta) = 0$. This also implies that $\frac{dc}{d\beta}\bigg|_{\beta=1} = 0$.

17 In Figure 2, observe that if we include an arbitrary cost in organizing a coalition, then the curve $V^\beta$ may be shifted down to the extent that it may not intersect $V^0$ at all. In this case $\beta=0$ would be the only stable equilibrium coalition.

18 In an earlier version (Lim (1981)) of this paper, it is shown how various types of equilibria could arise in the short run.

19 The idea of the relation between private motive and social customs is not new to economists. See, for example, Akerlof (1980), Arrow (1972) and Becker (1957, 1973, 1974).
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