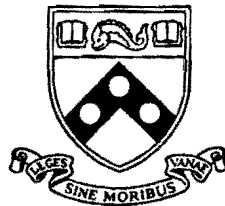*CARESS Working Paper #97-14*

The Social Basis of Interdependent Preferences

by

Andrew Postlewaite

UNIVERSITY of PENNSYLVANIA

Center for Analytic Research
in Economics and the Social Sciences

McNEIL BUILDING, 3718 LOCUST WALK

PHILADELPHIA, PA 19104-6297

CARESS Working Paper # 97-14
*The Social Basis of Interdependent Preferences**

Andrew Postlewaite
Department of Economics
3718 Locust Walk
University of Pennsylvania
Philadelphia, PA 19104-6297
apostlew@econ.sas.upenn.edu
http://www.ssc.upenn.edu/~apostlew/

October, 1997

The Social Basis of Interdependent Preferences
by
Andrew Postlewaite

Abstract

Most economists are sympathetic to the idea that concerns for relative position are an important aspect of many economic problems. There has traditionally been a reluctance to include such concerns primarily because models that included them often allow such a broad range of behavior that there are few, if any, restrictions on equilibrium behavior and, hence, such models would have little or no predictive power. In this paper we discuss how reduced form models may naturally give rise to utility functions that depend, in part, on relative standing. There are several advantages of modelling concern for relative standing in reduced form utility functions even when there is no similar concern in the "deep" preferences. It provides structure and constraints on the way that relative standing affects utility, and further, it can yield testable implications about the way that changes in the underlying environment affect the concern for relative standing. We discuss the advantages and disadvantages of modelling social concerns in this way and provide examples that illustrate how concerns for relative standing can affect savings, investment and labor choice decisions.

1. Introduction

Economics is among the most successful social sciences, due in no small part to the modelling methodology employed. Economic models traditionally build on individual maximizing behavior with the (often implicit) assumption that individuals' utility depends on a quite limited set of arguments. *Homo economicus* is concerned with the wage he will receive for performing a particular job, but not with whether his supervisor or co-workers admire him or respect his work.[1] He buys cars and jewelry for their utilitarian value, not to raise himself in the esteem of others.

At the same time that this single-minded materialistic focus has made economics successful as a discipline, it has led to a belief that economics methodology is inadequate to understand important aspects of human behavior, particularly in settings in which individuals are concerned about the opinions of others. The concern about the exclusion of social motivations and arrangements leads some even to question whether the traditional analysis of standard economic problems such as labor market behavior is flawed.[2]

Most economists are sympathetic to the idea that concerns about status (or relative position) are an important aspect of many problems including some that are of central interest to economists. There has traditionally been a reluctance to incorporate such concerns primarily because models that include them often allow such a broad range of behavior that there are few, if any, restrictions on equilibrium behavior and, hence, such models would have little or no predictive power.

In this paper I will discuss some of the reasons why concerns for rank are omitted from most economic models, and will outline an alternative modelling approach that addresses those difficulties. The alternative approach naturally gives rise to reduced form utility functions that depend, in part, on relative standing even when the direct utility function doesn't depend in any way on relative position. I will discuss in some detail the advantages of this approach and describe problems that have been successfully addressed using this approach. Before beginning, I want to emphasize that this paper is not intended to be a survey; it is a methodological argument for a particular research strategy. I will illustrate the arguments primarily with work that I have done with others.

2. Concern for relative ranking: is it direct or indirect?

To most people - including economists - it's clear that people in virtually every society care about other peoples' opinion of them. A central issue in how we model and analyze problems characterized by such concerns is whether that concern is "direct" or instrumental. That is, do people care about opinions of others *for their own sake* or because those opinions indirectly affect the goods and services they and their children will ultimately consume? When I interview for a job, I obviously care about the interviewer's assessment of my talents since that clearly affects my chances of being hired. I may or may not care *directly* whether the interviewer thinks me talented, independent of the effect that has on my getting this (or any future) job. If I care about my relative standing for its own sake, it may be appropriate to include it as an argument in the utility function; it's a determinant of relative satisfaction in the same way that any other variable is.[3]

2.1. The case for making relative ranking an argument of the utility function

The strongest argument for an innate concern for relative standing arguably is an evolutionary one. Human beings are the product of millions of years of evolution. There is a compelling case for our

---

[1] That is, he won't care about such things for their own sake; if there is uncertainty, admiration and respect may be correlated with such things as promotions or raises, about which he cares.

[2] See, e.g., Akerlof [1], particularly the introduction.

[3] We will argue below that even if individuals care directly about their relative position, one still might want to exclude it from the utility function.

basic preferences having evolved as a mechanism to induce us to behave in ways that have fitness value, that is, that increase the probability that we survive and have offspring. We have "hardwired" in us certain preferences that promote survival value; for example, our preference for sweet foods has likely evolved over a long period during which food was scarce and increased consumption of such foods was accompanied by increases in survival. A desire to ascend to the top of a social hierarchy may similarly have had selection value over the course of human evolution and consequently be similarly hardwired.

Many animals, particularly those most similar to humans such as apes and chipanzees, have a hierarchical social structure with top-ranked members faring better than others. Typically, high ranked members enjoy better access to food and mating opportunities than those ranked lower. In many species the ranking of males is determined through physical contests and there are obvious reasons that females should prefer more highly ranked males to lower ranked. First, almost by definition, highly ranked males are likely to be stronger, and consequently, able to afford better protection for the female and for offspring. Second, if the ability to perform well in the contests that determine rank are heritable, male offspring of a highly ranked male are likely to be highly ranked, and as a result, mate and reproduce well.[4] It follows immediately that if evolution has favored those females who were sensitive to male rank, evolution would necessarily favor males who tried to maximize their rank.

To the extent that humans are the end product (for now at least) of this evolutionary process, we should expect them to exhibit at least a residue of this concern for rank. The environment that modern humans inhabit may be drastically different from that which conferred an advantage on the largest and fastest of our ancestors, but the genetic structure that evolved when there was an advantage would remain long after the environmental change. Only if the characteristics that were once valuable become *disadvantageous* might we expect evolutionary forces to eliminate them, and even then, very slowly.

It would thus be natural for humans to be genetically programmed not only to care about food and sex, but also to care about their relative position in groups in which they find themselves. An argument that such hardwiring serves no useful purpose is no more relevant than to point out that it is dysfunctional that an individual salivates at the sight of a plate of foie gras; any single individual's preferences are exogenously given.

2.2. Disadvantages of making relative ranking an argument of the utility function

2.2.1. Parsimony

Economics has been successful, particular among the social sciences, because of the restrictions imposed by the assumptions of the models employed. Models can have predictive power only to the extent that some behavior is inconsistent with the assumptions of the model. The central assumption in economics is that of rational self-interested agents. The assumption that agents choose those actions that maximize their self interest, however, puts no restrictions on behavior unless there are simultaneous restrictions on what might be in agents' self interest. If a modeler is free to specify what constitutes an agent's self interest, he or she can simply posit that an agent's self interest is such that any particular behavior gives the most satisfaction; that behavior is then consistent with maximization of self interest.

The force of the rational-agent assumption in economics derives from concurrent restrictions on preferences. In interesting economic models, agents' preferences are either unchanging over time, or change in a very structured way depending on history. Similarly, most economic models restrict agents' preferences so that they depend on goods and services consumed by them or their offspring.[5] Most

---

[4]Note that this argument doesn't depend on the characteristics having any inherent benefit; females who mate with males that have (heritable) traits that other females find desirable will find that their male offspring have plentiful mating opportunities. Peacocks' tails are a prototypical biological example of this.

[5]There are exceptions, of course. See, e.g. Deusenberry[9], Frank[10], and Robson[17]

(perhaps all) economists understand that these restrictions on preferences are unrealistic: feelings of affection, envy, and rivalry surely affect decisions in ways not consistent with traditional economic models. There are two primary reasons that economists continue to utilize models that exclude such considerations. First, adding variables that affect individuals' utility weakens the conclusions that can be drawn from the analysis. Second - and in my opinion more important - is that economists have been extremely successful in their attempt to "explain" human behavior using economic models without including such variables. Becker[3] said this very nicely - the "combined assumptions of maximizing behavior, market equilibrium and stable preferences, used relentlessly and unflinchingly ... provides a valuable unified framework for understanding *all* human behavior." This, of course, isn't an argument that other things won't improve our ability to model and understand some aspects of human behavior; it *is* an argument for pushing the traditionally restricted models in new directions to see how well we can describe human behavior with such simple models.

2.2.2. What precisely is hardwired?

While the evolutionary argument that there is some kind of concern for rank or status hardwired in humans is compelling, it's unlikely that *all* the determinants of rank are hardwired. As suggested above, sensitivity to characteristics like speed and strength might naturally be the residue of evolutionary forces; it is distinctly less likely that a desire to be the best dressed or to have the most advanced university degrees would be hardwired as a consequence of evolutionary forces. A ranking based on intelligence might be hardwired, but the degree to which one's position in society is enhanced by academic achievement must come from a correlation between academic achievement and intelligence. If the underlying hardwired concern is for intelligence, we should expect that in a society in which the best and brightest choose military careers, academic achievement will enhance status less than in one in which those individuals become doctors and professors. While it is probably justifiable to take some kind of a concern for rank as exogenous, we should expect that the relationship between such things as education, wealth or particular occupations to be culturally determined, and moreover, that the relationship is likely to vary across societies, and within a single society, across time.

2.3. An alternative approach

There is an alternative approach that can include social concerns in economic models without adding social variables as arguments in individuals' utility functions. We can derive social concerns as "instrumental", in reduced form utility functions, while maintaining the standard economic modelling methodology based on optimizing individuals who have stable preferences over the goods and services they and their children consume.[6] This approach starts from the belief that while standard economic markets determine much that people care about, they don't determine all. Furthermore, how the remaining aspects are determined can have important repercussions on economic behavior.[7] We call the method by which these remaining aspects are determined "social arrangements". Because of the interaction between social arrangements and economic behavior, we cannot completely understand how markets operate without considering how the social arrangements interact with markets. This basic idea is best illustrated by an example.

---

[6]Some sociologists suggest something like an instrumental argument for why status is important, namely that it provides one with a claim to good treatment from others. This begs the question of *why* others would give this good treatment. One possible answer is that high status can serve as a coordinating device. That is, high status people may be able to cooperate better when they interact than do others. (See, e.g.,Brooks [5], Okuno-Fujiwara and Postlewaite [16], and Fershtman and Weiss [18]).

[7]I don't mean to suggest that there is necessarily a sharp line between market and nonmarket mechanisms by which outcomes in a society are determined. There will, however, be clear examples of each.

5

2.4. An induced concern for relative rank

Cole, Mailath and Postlewaite [6] illustrates how social arrangements can interact with market behavior. That paper augmented a standard growth model with a matching decision between men and women. It was assumed that individuals cared only about their own and their offsprings' consumption, and that after matching any consumption was joint (that is, consumption within a pair was a public good). To the extent that members of either sex have different wealth levels, the joint consumption induces preferences over potential mates: wealthier mates are more desirable. In terms of the discussion above, the matching process is treated as a social arrangement that affects consumption of standard goods and services rather than being mediated by traditional markets.

A natural process by which men and women might match is that the wealthiest women match with the wealthiest men, that is the matching process could be positively assortative on wealth. It's clear that this nonmarket matching decision affects peoples' savings-consumptions decisions. Before matching, the motivation for people to save is not simply to provide for future consumption, but also to make oneself more attractive as a mate, and consequently, net a wealthier mate. When we ignore the social aspect of the problem (the matching) and look only at the savings-investment decision, it would *seem* that people have the sort of social concern mentioned above: people care not only about their own wealth, but also about their relative standing in the wealth distribution. But this concern for relative standing is not in the deep preferences, but is induced in the reduced form preferences because relative standing in the wealth distribution affects individuals' consumption of ordinary goods. Consumption is affected because the obtainable mates depend on one's wealth relative to competitors' in the mating contest. To summarize: individuals have a concern for relative standing because relative standing is instrumental in determining ultimate consumption levels.

2.5. Advantages of deriving social concerns as instrumental

There are a number of advantages of modelling social concerns as arising instrumentally because of the interaction between social arrangements and economic markets. The first obvious advantage is that mentioned above: it allows an analysis within the traditional economic paradigm of agents optimizing with stable preferences that depend on standard commodities. As such, the analysis extends the scope of behavior that can be explained within this paradigm without loss of predictive power.

A second advantage is that it allows us to study the degree to which the economic fundamentals affect social arrangements. Moreover, the interaction of markets and social arrangements can naturally lead to an important multiplicity - one that would be missed if social arrangements were taken as exogenous. Differing social arrangements may well induce different incentives for market activities; consequently, different social groups governed by different social arrangements may exhibit different reduced form preferences. If we start from the assumption that peoples' deep preferences are the same and model the social arrangements explicitly, we can derive the differences in reduced form utility functions rather than take them as exogenous.

2.5.1. Multiplicity of social arrangements

In the work described above (Cole, Mailath and Postlewaite [6]), we suggested that the natural social arrangements in the growth model with matching might be that the wealthiest women match with the wealthiest men. That is not, however, the only possible social arrangement. That paper also analyzes an alternative social arrangement with a different ranking which we call aristocratic ranking.[8] Here, men in the first generation are arbitrarily assigned a rank, with no assumed connection between rank and wealth. The social arrangement prescribes that in each generation, the men with the highest rank match with the wealthiest women; further, people who violate the prescribed behavior will have their

---

[8] See also Cole, Mailath and Postlewaite [7].

male offspring's rank reduced to zero. If all others are following the prescribed behavior, the effect of a woman's deviating from the prescriptions of this social arrangement on the offspring is that he will match with a less wealthy woman. Hence, a wealthy woman for whom the social arrangements prescribe a highly ranked but less wealthy mate who would be tempted to match instead with a richer man could be deterred by the consumption consequences to her offspring (about whom it is assumed she cares).[9] We demonstrate that for some economies, there is a Nash equilibrium of the game induced by these social rules that supports the social arrangement.

The point here is that we may have two economies that are exactly the same (as far as the number of individuals, their preferences and their endowments) that exhibit very different economic behavior because they are governed by different social arrangements. In the economy in which rank is determined by wealth, individuals will save more to improve the rank of their offspring. In the other, rank is inherited, and hence independent of wealth, reducing the optimal level of savings; the social arrangements here suppress one of the benefits of forgoing consumption. Any attempt to understand the differences in economic performance in these two economies must necessarily fail unless the analysis includes the social arrangements and an investigation of the incentives they provide.

This last point is important. A central question in economics is why economies perform differently. Economists find it difficult to explain the variance in performance by observed differences in such things as raw materials, weather, property rights, and so on. One possible difference not normally considered is that there is a difference in what is "valued", that is, what gives one "status". Clearly, there can be large differences in incentives that accompany different social arrangements.

2.6. Market imperfections as the basis of rank concerns

The central idea of this paper is that social arrangements interact with economic decisions and that the interaction arises because of market imperfections. The models described above have as an integral part a matching market that is not price-mediated. I want to distinguish this central idea from the related but distinct problem of positional goods.

Houses in particularly scarce and desirable locations and admission to elite private schools are sometimes called positional goods, that is, goods that will ultimately be consumed by the wealthiest individuals in a society[10]. Positional goods resemble the problems we've been discussing but there are important distinctions. First, there may be positional goods even with complete Arrow-Debreu markets. With complete markets, the first welfare theorem holds whether or not there are positional goods: the final allocation, including all savings and effort decisions, is Pareto efficient. There is no real externality in economic decisions other than the standard pecuniary externality, which complete markets mediate perfectly. Another way of saying this is that when individuals make decisions, the price vector of marketed goods is the only information an agent needs for decision making. This is not the case for the problems we have discussed; it is precisely the nonmarket goods or decisions that people care about and can indirectly influence through their market decisions that make them care about other agents' decisions *in addition* to all prices of market goods. There is no reason to expect that when social arrangements rather than markets mediate the allocation of some goods and services the outcome will be Pareto efficient. Indeed, given that we have seen that for some economic problems there can be distinct outcomes that can result from different social arrangements, at least some of these social arrangements *must* be associated with inefficient outcomes.

Another aspect of the approach described here as distinct from the case in which markets are complete is that complete markets greatly limit the scope of societal differences that can be reconciled

---

[9] This point is important: the woman follows the prescriptions of the social arrangements because it is strictly in her interest to do so. We are interested only in social arrangements that are completely consistent with optimizing behavior. Our approach to modelling social concerns would be distinctly less interesting if we postulated social arrangements that violated this basic aspect of the standard economic paradigm. We will say more about this below.

[10] See Frank [10] for a discussion of positional goods.

with equilibrium behavior. The growth model described above in which there are both equilibria that rank agents by birth and equilibria in which they are ranked by wealth shows that otherwise identical societies can perform differently as a consequence of different social arrangements. Complete markets, of course, allow multiple equilibria, but it's hard to see how that multiplicity can be seen as stemming from underlying social structure.

If the driving force of our argument that social arrangements matter is market imperfections, what are the market imperfections that are so important? We used a specific market imperfection - matching - as the basis of the work described above. While we believe this particular imperfection is important, we think there are myriads of goods and decisions about which people care but that individuals don't purchase through standard markets. Country club memberships, memberships to charitable boards or universities, invitations to the White House, and assigned seats in churches or synagogues come easily to mind as examples. To be sure, these items often don't come for free, but they are not obtained through a simple market purchase. A large donation is probably a necessary - but not sufficient - condition to be invited to the White House or to the boards of trustees of charities.

Cole, Mailath and Postlewaite ([6]and [8]) used matching for both the motivation and the formal modelling of the market imperfection for conceptual reasons. It would be straightforward to assume that there is some good that is allocated through a tournament (for example by relative wealth) instead of being allocated by markets and carry out most of the analysis in those papers. A compelling case for why social arrangements matter, however, should provide some explanation for *why* the allocation of some goods isn't mediated by price. That is, if particular memberships on boards of trustees (or desirable seats in restaurants or invitations to the White House) are particularly desirable, why can't one dial up, ask the price and charge it on Visa? From a positive point of view, it's clear that this isn't the case. From a conceptual point of view, part of the reason these things are valued is related to the fact that they are *not* bought and sold in a standard way. Nevertheless, if our goal is to understand what seems to be a concern for rank in an entirely standard economic model, any proposed explanation should be based on a clear specification of how any particular behavior affects the goods and services agents consume, uniformly assuming that agents optimize. A proper explanation that relied on the existence of goods or decisions like these should articulate clearly how the system is sustained in the face of optimizing behavior.

The matching decision meets this exacting requirement: There is a clear and plausible link between behavior and consumption and every agent is perfectly optimizing. While we believe that the insights based on this specific market imperfection are widely applicable, it remains an interesting open problem to model carefully how some of the other decisions such as board memberships can be reconciled with fully optimizing behavior in a convincing manner.

3. Why not take the indirect preferences as the primitive?

There is a natural temptation to use the above arguments about how a concern for rank can arise instrumentally in a standard economic model with market imperfections as a basis for treating the concern as a primitive. That is, once we are convinced that agents have such a concern, why not simply write down the utility function with rank as an argument? We would not be violating the bounds of the parsimonious economic paradigm that we argued were important; we would simply put in a footnote saying "We assume that agents have entirely standard preferences but that there are market imperfections that induce a concern for rank; we begin our analysis with those preferences."

To assess the merits of such an approach we should note that it isn't at all clear what should really be the primitive arguments of a utility function. In our basic textbooks we are quite comfortable with analyzing the behavior of an agent whose utility function has hamburgers and french fries as arguments. A neurobiologist might argue that that isn't the "true" deep utility function because what really makes an individual happy is neurons firing in the brain; the individual only seems to enjoy the

hamburger and fries because they cause the neurons to fire in a particular way.[11] In short, he could argue that the hamburger and fries are "instrumental" in satisfying the deep preferences over neuron patterns.

Nevertheless, economists are quite content to use these instrumental preferences both for motivation and for empirical work. This is entirely appropriate if we are trying to predict the behavior of an individual when the price of hamburgers change or new menu items arise. For these kinds of questions, there is a stable and exogenous relationship between food bundles and the neuron pattern they will induce and we lose nothing by replacing the more complicated pattern of neurons by the more familiar hamburger and fries. We might go wrong, however, if we considered questions in which the relationship between the instrumental goods and the neuron patterns wasn't fixed and (more or less) immutable. For example, if we wanted to investigate the effect of feeding someone a hamburger and fries three times a day for a year, we might expect the pattern to change; what was pleasurable at the beginning might be sickening eventually. Similarly, we might ask why more Japanese than Americans find seaweed and sushi more appetizing than a hamburger and fries. A simple explanation would be that there are genetic differences that account for the different neuron-firing patterns that result from a seaweed and sushi lunch. A more plausible explanation is that the differences arise because the relationship between neuron firing and a particular food is formed by the individual's past eating habits; particular eating patterns determines the relationship. There is little lost in beginning with the "instrumental" preferences with hamburgers as an argument in predicting demand changes following price increases because the relationship between instrumental and deep preferences varies little over the range of economic circumstances being considered. It would be a mistake to ignore the determinants of the relationship if one wanted to understand different instrumental preferences across different societies or to understand and predict systematic changes in instrumental preferences over large time periods.

In precisely the same way, we can indeed begin with the instrumental preferences including rank concerns for problems in which we believe that the relationship between rank and final consumption is fixed and unchanging. But our interest in the instrumental concern stems from a belief that the form of the relationship between rank and consumption differs across societies. Different societies may well rank individuals by different characteristics or there may be different sets of goods and services that are not allocated through markets, and hence, serve as motivators to enhance rank. Even if the variable determining rank is fixed - say wealth - different distributions of that variable will lead to different reduced form preferences. Policy choice may be unlikely to change the relationship between a hamburger and the associated neuron firing pattern, but changes in tax law, say, can easily change the wealth distribution, and consequently, the instrumental preferences. In other words, we have to be aware that these instrumental preferences may not even be fixed within the range of alternatives we are considering in a single analysis.

3.1. Preference formation

In discussing an individual's concern for rank, we have focussed on two polar extremes: first, that such concerns are hardwired in humans through evolutionary forces, and second, that such concerns are instrumental and that there is no direct concern. The discussion above about how eating habits might affect food preferences suggests a position intermediate to these polar cases. We could view adults as having fixed and stable preferences that depend on childhood history. More specifically, we can view parents as caring about the consumption of their children (and nothing else) and attempting to outfit their children with preferences that will maximize their consumption. For example, if being wealthier than others leads to matching that results in higher consumption, parents may want to instill in their children a concern for relative wealth position (that is, a desire to be wealthier than others). Of course,

---

[11] This discussion is a variant of Lancaster's [11] argument that a consumer's preferences over goods are *derived* in the sense that the goods are required only to produce more fundamental characteristics about which the consumer cares.

if this leads to higher consumption for the child, it should be enough for the child to recognize the relationship between relative position and consumption; there should be no need for parents to induce a direct concern for rank. Parents may be concerned, though, that children may *not* recognize the relationship, or they may worry that the child will see the relationship but make trade-offs between wealth accumulation and current leisure that do not maximize consumption. In other words, parents may naturally have different preferences over their childrens' alternatives than do the children. To the extent that parents can affect their childrens' preferences, they will choose (or alter) them to maximize the parents' objective function.

This suggests that parents may not care at all about their childrens' relative rank directly, but instill in their children such a concern for instrumental reasons. From the childrens' point of view, they might as well have had a hardwired concern for relative position: their concern about relative rank is the same whether it results from parental indoctrination or evolutionary forces. From the standpoint of economic analysis, however, there is a significant difference between the two situations. We should expect that differences across societies in social organization are not due to biological evolution; the time span during which important societal differences is too short for biological selection forces to result in different hardwired preferences. Concerns that arise as a result of parental choice, on the other hand, can change in a generation. When a society is hit with a shock, so that the type or intensity of social concern that is optimal changes, parents can immediately respond. The primary point that I want to make here is that the advantages of an instrumental approach that I outlined above apply here as well. There will typically be a multiplicity of equilibria, exhibiting differing intensities of a concern for rank and differing activities or characteristics that establish relative rank. As a society changes, the form of the concern for rank will change as well. In summary, the nature of the concern for rank is tied down by optimizing behavior of agents. This will in general provide substantially more structure than an approach that takes a concern for rank as exogenously given and, for many problems, provides additional testable implications.

4. Conformism

The concern for rank that we have thus far focussed on is perhaps the most compelling example of social concerns that affect economic decisions, but a close competitor would be a concern to conform.[12] The question of whether people are predisposed to behave like those with whom they associate is of central importance to policy questions concerning education, drug control, crime prevention and welfare (among others). Arguments similar to those above for treating social concerns as instrumental apply here as well. While there are undoubtedly evolutionary arguments for a hardwired concern to be like others, simply putting such a concern into the utility function has disadvantages similar to those discussed above. As we have repeatedly stressed, adding arguments to the utility function weakens the predictions that can be made. Similar to the arguments concerning rank, we don't know the particular form that a concern to conform will take; is it that we desire to dress like others, talk like others, or engage in the same activities as others? Why is there general consensus that some Asian societies exhibit more conformist behavior than Western societies? Again, an explanation that relies on genetic differences is less satisfying than an explanation that is based on different consequences for conforming or not conforming in different societies.

Our theme has been that market imperfections are the basis for the substantive interaction between social arrangements and economic decisions. The existence of decisions (such as matching) that affected consumption but were not mediated by a price mechanism induced a tournament in whatever ranking characteristic determined the outcome of those decisions. There is a similar market imperfection

---

[12]See Akerlof [2] and Bernheim [4] for examples. As does much of the work on conformism, these papers exogenously assume a desire to conform; in an interesting paper, Morris [12] derives an instrumental desire to conform.

that leads naturally to conformist behavior: public goods or public decisions.[13] There are many consumption activities that are undertaken (at least sometimes) in groups such as dining out, going to concerts and plays, entertaining, sports activities, etc. For group activities, there are common decisions to be taken by the group: how often to eat out and how expensive a restaurant to go to, whether to drive to a nearby ski slope or fly to more exotic but distant resorts, etc. There is often a price-quality "menu" from which the group can choose, from the cheaper but mundane to expensive and exciting. The group's decision typically reflects the preferences of the individuals in the group.

4.1. An induced concern to conform

Suppose the group decision is how expensive a restaurant at which to dine. If the dinner bill is split evenly, higher income groups' choices will be expensive in comparison with lower income groups. A consequence is that an individual with a given endowment will spend more as the group(s) he is a member of is wealthier.[14]

Consider now an individual's labor-leisure choice problem. In the reduced form problem, we typically would maximize the individual's (reduced form) utility function over leisure and money, where the utility of money is the utility derived from the goods on which the money is ultimately spent, including dining out. The point we wish to make here is that the individual's choice problem is affected by his or her social group. Take two identical people (that is, the same preferences and endowments) who belong to social groups that qualitatively differ in that one of the social groups consist primarily of people with lower incomes while the second has richer people. The richer group will spend more dining out than the poorer, and because of the joint nature of this, the individual in the richer group will spend more than the identical individual in the poorer group. Since each of the individuals' optimal choice of labor must equate the marginal disutility of effort with the marginal utility of non-dining consumption, the individual in the richer group will choose to work more than his clone in the poorer group.

An analyst who ignored the social arrangements (the dining decision) might have explained the different behavior as social striving by the harder working individual, but this would be erroneous. The different work and consumption behavior of the two is due entirely to the differences in their respective groups. The structure of the problem, including the social arrangements, generates what appears to be a "conformist" tendency in which people's labor supply choices cluster together. For any given group, the wealthier in the group will work less and the poor will work more than they would in the absence of the joint consumption activity. What appears to be conformism is, however, purely instrumental. The utility functions are (more or less) standard,[15] devoid of any psychological or sociological desire to be more like others.[16]

The point of this simple example is that it is not necessary to deviate from traditional economic modelling methodology to understand or explain behavior that seems driven by social considerations. More importantly, the model outlined has testable implications about differences in behavior that

---

[13] The discussion that follows draws on Norman [14] and Norman and Postlewaite [15].

[14] We take the group or groups of which an individual is a member as exogenous. We discuss below the effect of this assumption.

[15] The group dining activity is perhaps not completely standard.

[16] Neumark and Postlewaite [13] carry out an empirical exercise related to the discussion above. That paper analyzes a reduced-form model that incorporates into a standard neoclassical framework relative income concerns in women's (or families') utility functions. In this model, the entry of some women into paid employment can spur the entry of other women, independently of wage and income effects. The model is tested by asking whether women's decisions to seek paid employment depend on the employment decisions of other women with whom relative income comparisons might be important. Specifically, that paper looks at the effect of sisters' employment on women's own employment, taking into account the possibility that there may be heterogeneity across families in unobserved variables affecting the employment decision. A variety of tests provides strong evidence that women's employment decisions are positively affected by a concern about the relative income of their sisters' employment decisions.

arise from different social environments (although it might be hard to find the kind of data necessary to carry out the tests).

4.2. Multiplicity of social arrangements

There can be a multiplicity of social arrangements with different impacts on economic decisions in this example, as there was in the growth example discussed above. In the example, we left unspecified the precise manner in which the individuals' preferences over restaurants would be aggregated into a group decision. One possibility is that the system is simply a majority voting system, choosing the median group member's optimum. There is, however, no compelling argument for this particular social arrangement to be canonical. Some groups could be organized by such social arrangements but others could as well be governed by other arrangements. For example, a group could allow any member to "veto" a restaurant as being too expensive. This is equivalent to letting the poorest individual in the group choose the restaurant. These two alternative social arrangements lead to different reduced form utility functions, even if we fixed completely the characteristics of the members of a group. The group governed by a social arrangement in which the restaurant choice is the optimum for the median person will systematically spend more on restaurants than the group for which the restaurant choice is the poorest person's optimal choice. This induces every member of the group to work more; as in the ranking case, any attempt to understand the different economic behavior of two such groups is hopeless unless the social arrangements are part of the analysis.

There is a broader range of social arrangements for this simple example than just how the restaurant is chosen. Once the restaurant choice was made, we assumed that the bill would be split evenly. While plausible, there are clear alternatives. For example, the richer members of the group might pay more than the poorer members.[17] As before, different social arrangements generate different incentives for agents' economic decisions.

We want to emphasize that there is no canonical way in which we could "correct" the market imperfection. There typically will be an infinite number of social arrangements that can govern group decisions. No one of these Pareto dominates the others, and we should expect that different arrangements emerge in different societies generating different incentives in these societies.

4.3. Endogenous social groups

The example treated the group to which individuals belonged as exogenous. We will make several comments about this. First, it is obvious that if we modified this model to let individuals choose their social group and if there are sufficiently many people of each ability, people will choose to be in a group with people who are identical to themselves. This is essentially the local public goods result that homogeneous communities are optimal in a simple model like this.

There are several things that mitigate against perfectly homogeneous social groups, however. The whole concept of social groups is somewhat fuzzy. Although the general idea of social groups is compelling, identifying a particular social group and its members precisely is impossible. Abstract social groups as we are using the term presumably include some of an individual's relatives, most of whom are exogenously determined. Also included in one's social group are some or all of one's neighbors. The house one purchases is obviously endogenous; the choice is to a large extent determined by the social group to which one wishes to associate. But since the world is not composed of perfectly homogeneous neighborhoods, some heterogeneity of social groups may be unavoidable. Third, even if people initially chose to be in homogeneous social groups, there are substantial transactions costs that prevent easily changing one's social group. Life cycle effects and random shocks will naturally introduce substantial heterogeneity into an initially homogeneous group.

---

[17] This is perhaps more than a plausible alternative since the outcomes that result from social arrangements prescribing equal division of bills can often be Pareto dominated by outcomes made possible by subsidization of the poor by the rich.

Even if we endogenized social groups, we shouldn't necessarily expect the outcome to be perfectly homogeneous groups. The simple model outlined above abstracts from many aspects that could be important if we endogenized social groups. Folk wisdoms such as "It's better to be a big fish in a small pond" suggest advantages of being above average in one's social group while the socially ambitious individual who doggedly attempts to gain entry into groups well above his or her station is a staple of western literature. There is a tension between the desire to be in a homogeneous group to minimize the conflicts on group decisions and the concern from rank discussed above.

5. What accounts for different social arrangements in different societies?

We argued above that the multiplicity of equilibria for a fully specified economy, where the multiplicity stems from different social arrangements, is a valuable tool in understanding differences in economic behavior and performance across economies. It might seem that this approach simply pushes the indeterminacy one level deeper without really increasing our understanding. In a sense, we have replaced the explanation "people in different economies have different preferences" with the explanation that they are governed by different social arrangements that induce different reduced form preferences.. There is, however, additional structure that comes from the instrumental approach. For example, we pointed out above that people may have an instrumental concern for relative wealth and the reduced form utility function incorporating that concern will depend on the distribution of wealth. Policies that lead to changes in the distribution will result in changes in reduced form preferences. The process of explicitly modelling the social arrangements provides structure that leads to testable hypotheses; simply adding relative wealth as an argument in the utility function would not do this.

Nevertheless, we are sympathetic to a view that the work described above leaves unanswered the basic question of why different economies perform differently. For this we need an understanding of why different societies are governed by different social arrangements. The modelling approach described here has the potential to do this. We described above how decisions that are not mediated through normal markets could induce a concern for rank, and further, how there could be both equilibria in which people are ranked by birth and by wealth. The additional structure that comes from the specification of the instrumental value of rank has the potential to provide insight into the circumstances when one or another rank would more likely arise.

Consider for example a variant of the models described above in which some nonmarket decisions induce a concern for rank, but in which people have the opportunity to invest either in physical capital that could be bequeathed to one's children in the standard way or in human capital which could be passed on to one's children through training and teaching. Such a model might well have equilibria in which the ranking that determines the nonmarket decisions is based on either of the two variables.

Suppose that we add some small uncertainty, say a small probability that everything an agent owns is confiscated. To the extent that human capital is (at least relatively) freer from the risk of confiscation, it might be more likely to arise as the determinant of ranking than physical capital in the face of confiscation risks. This is not simply because human capital accumulation may be a more efficient way to help one's children in this environment (which it may or may not be depending on the parameters of the problem). Rather, it may be that ranking by human capital is more stable than ranking by physical capital, even if physical capital is sufficiently more efficient than human capital to offset its greater vulnerability to confiscation. In other words, it may be that social arrangements that rely on physical capital simply disappear with high enough probability relative to social arrangements based on human capital that we would generally expect to see human capital rankings in these environments.

The basic point is that some social arrangements are more stable than others. The fundamentals of one economy may allow a particular social arrangement to survive while the social arrangement

might not be sustainable in another.[18] Once again, the additional structure provided by a complete specification of the underlying foundations of the social arrangements provide implications beyond those that are possible when those arrangements are taken to be outside the scope of analysis.

6. Further applications of the instrumental approach

6.1. Conspicuous consumption

Cole, Mailath and Postlewaite [7] applies the ideas in [6] to the question of conspicuous consumption. Economists from Adam Smith to Thorstein Veblen have noted that much of people's consumption is directed to impressing others. It is typically taken as given that people desire to impress others, consciously or unconsciously treating the question of *why* people want to impress others as outside the domain of economics. The model in [7] adds uncertainty to a nonmarket matching decision similar to that described above. Here wealth is unobservable but still important to potential mates. Individuals with relatively high wealth have an incentive to signal this fact, if possible. In this model, people will engage in conspicuous consumption even though they are fully rational with standard preferences. Agents conspicuously consume because it's instrumental: in equilibrium, it results in wealthier mates and, consequently, higher consumption. Poorer individuals could, of course, consume in the same manner as wealthier individuals but choose not to because of the (relatively) high opportunity cost of doing so. The inferences to be drawn from consumption patterns are equilibrium inferences.

As before, deriving agents' desire to impress others as instrumental achieves several goals. It again allows an "explanation" of a particular behavior of interest within the standard economic paradigm. Perhaps more importantly, it provides additional structure that has further implications, some of which provide testable hypotheses. For example, if conspicuous consumption serves as a device through which agents can signal their otherwise unobservable wealth, we would expect differing amounts of conspicuous consumption in different environments. In economic situations in which there is very good information about agents' wealth, there is less incentive to conspicuously consume than in situations in which there is poor information about wealth. If one believes that automobiles are a prime instrument for signalling wealth and that information about agents' wealth is better in small communities than in large communities, we expect that, *ceteris parabus*, people in large communities would spend more on automobiles than in small communities[19]. Similarly, we would expect that new arrivals to an area would spend more on such items if there is greater uncertainty about their financial status.[20]

These implications focus on the degree of uncertainty as a motivation for signalling. There are also implications that stem from differences in the rewards to having signalled. The incentive to conspicuously consume is to attract a wealthier partner. If there is little difference in potential partners, there is little incentive to engage in costly consumption. The greater the variation in the wealth of potential partners, the greater is the predicted conspicuous consumption.

I should emphasize that we have not done the empirical work suggested. I use the examples to illustrate how the additional structure that comes from deriving endogenously the concern leads to implications that wouldn't be apparent if one takes as exogenously given the desire to impress others.

6.2. Labor supply

Cole, Mailath and Postlewaite [7] analyze a second model in which individuals are concerned with matching. As above, there is a ranking based on wealth, that is, wealthier individuals will match with wealthier mates. In this model, individuals with differing abilities are faced with a labor-leisure choice.

---

[18] Cole, Mailath and Postlewaite [8] and Brooks [5] discuss this possibility in detail.

[19] Similarly, one would expect greater expenditure on other conspicous consumption items such as expensive watches and clothes.

[20] This is meant to be illustrative; obviously there is a very serious selection bias in both examples.

Again, the tournament-like competition for mates leads (in equilibrium) to greater effort than would be the case in the absence of the concern for rank. The main point of this model, however, is that an agent responds differently to a lower wage when other agents' wages remain the same than he would if those agents' wages were also lowered.

When all agents' wages were lowered, an individual will face a different wealth distribution than he did previously. If no agent changed his labor supply in the face of a uniform wage decrease, the ranking of agents will be unchanged. If, on the other hand, a single agent's wage was lowered, the wealth distribution of the other agents would be unchanged. A single agent who leaves his labor supply unchanged when his wage alone decreases would see his rank drop, and as a consequence he would be matched with a less wealthy mate.

In general, when increases in wealth or income lead to secondary benefits due to the social arrangements, agents will respond differently to individual-specific and aggregate shocks. For problems in which the difference is significant, the common practice of using microeconomic data to draw inferences about responses to aggregate shocks presents difficulties that are often overlooked since the micro data may include responses to individual shocks that systematically diverge from responses to the same shock when it is applied uniformly to all agents in a society.

These considerations are particularly relevant for problems such as predicting the effects of an income tax. If the secondary benefits that derive from the rank in a society dominate the direct consumption benefit from income, an increase in income tax would have no effect on labor supply since it leaves unchanged the relationship between effort and rank. To the extent that the secondary benefits are important and ignored, there would be a systematic overestimate of the effect of taxes on labor supply.

There is a second potentially interesting effect of tax policy that is typically ignored. The basic interaction between rank and economic decisions stems from the fact that by altering behavior (saving more, working harder, spending more conspicuously) an individual can increase his or her rank in society. This tournament-like effect typically distorts decisions and the magnitude of the distortion depends on the benefits from distorting. Greater secondary benefits will obviously lead to greater distortions. There is another less obvious determinant of the incentive to distort, namely the dispersion of wealth in the society. In a society with an extremely disparate distribution of wealth, it might take very large changes in my economic decision (saving, labor supply, etc.) to increase my rank by, say, one percent. But if the wealth distribution is very tight (that is, a relatively equal wealth distribution), the same change in my economic decisions will lead to large increases in rank, and consequently, relatively large secondary benefits. The more equal the wealth distribution, the greater is the marginal secondary benefit from distorting economic decisions. The implication for tax policy is that, *ceteris parabus*, tax policies that lead to more equal distributions of income or wealth provide greater incentives to working and saving.

References

[1] G. Akerlof. *An Economist's Book of Tales.* Cambridge Univesity Press, 1984.

[2] G. Akerlof. Social distance and social decisions. *Econometrica*, pages 1005–1024, 1997.

[3] G. Becker. *The Economic Approach to Human Behavior.* University of Chicago Press, Chicago, 1976.

[4] D. Bernheim. A theory of conformity. *Journal of Political Economy*, pages 841–877, 1994.

[5] N. Brooks. *Effects of Community Characteristics on Community Social Behavior.* PhD thesis, University of Pennsylvania, 1995.

[6] H. L. Cole, G. J. Mailath, and A. Postlewaite. Social norms, savings behavior, and growth. *Journal of Political Economy*, 100:1092–1125, 1992.

[7] H. L. Cole, G. J. Mailath, and A. Postlewaite. Incorporating concern for relative wealth into economic models. *Federal Reserve Bank of Minneapolis Quarterly Review*, 19 (Summer):12–21, 1995.

[8] H. L. Cole, G. J. Mailath, and A. Postlewaite. Response to 'Aristocratic equilibria'. *Journal of Political Economy*, 103:439–443, 1995.

[9] J. S. Duesenberry. *Income, Saving, and the Theory of Consumer Behavior*. Harvard Univ. Press, Cambridge, MA, 1949.

[10] R. H. Frank. *Choosing the Right Pond: Human Behavior and the Quest for Status*. Oxford University Press, New York, 1985.

[11] K. Lancaster. *Consumer Demand: A New Approach*. columbia University Press, New York and London, 1971.

[12] S. Morris. An instrumental theory of political correctness. Mimeo, University of Pennsylvania, 1997.

[13] D. Neumark and A. Postlewaite. Relative income concerns and the rise of female labor force participation. *Journal of Public Economics*, forthcoming.

[14] P. Norman. Notes on interdependent preferences. Mimeo, 1996.

[15] P. Norman and A. Postlewaite. An instrumental model of conformism. Technical report, University of Pennsylvania, work in progress.

[16] M. Okuno-Fujiwara and A. Postlewaite. Social norms in random matching games. *Games and Economic Behavior*, 9:79–109, 1995.

[17] A. Robson. A biological basis for expected and non-expected utility. *Journal of Economic Theory*, 68:397–424, 1996.

[18] Y. Weiss and C. Fershtman. Why do we care about what others think about us? mimeo, Tel Aviv University, July 1996.

This is a list of recent CARESS Working Papers. A complete list (dating from inception of the series) can be obtained by writing to:

Ms. Diana Smith
CARESS
3718 Locust Walk
McNeil Building
Philadelphia, PA 19104-6297

94-01 "Expected Utility and Case-Based Reasoning" by Akihiko Matsui
94-02 "Sequential Stratified Sampling" by Edward J. Green and Ruilin Zhou
94-03 "Bargaining, Boldness and Nash Outcomes" by Simon Grant and Atsushi Kajii
94-04 "Learning and Strategic Pricing" by Dirk Bergemann and Juuso Valimaki
94-05 "Evolution in Mechanisms for Public Projects" by Roger D. Lagunoff and Akihiko Matsui (previous version 93-14)
94-06 "Constrained Suboptimality in Incomplete Markets: A General Approach and Two Applications" by Alessandro Citanna, Atsushi Kajii and Antonio Villanacci
94-07 "Pareto Improving Financial Innovation in Incomplete Markets" by David Cass and Alex Citanna (previous version 93-27)
94-08 "Commodity Money Under Private Information" by Yiting Li
94-09 "Generic Local Uniqueness in the Walrasian Model: A Pedagogical Note" by Marcos de Barros Lisboa
94-10 "Bargaining-Induced Transaction Demand for Fiat Money" by Merwan Engineer and Shouyong Shi
94-11 "Politico-Economic Equilibrium and Economic Growth" by Per Krusell, Vincenzo Quadrini and José- Víctor Ríos-Rull
94-12R "On the Evolution of Pareto Optimal Behavior in Repeated Coordination Problems" by Roger D. Lagunoff
94-13 "Evolution and Endogenous Interactions" by George J. Mailath, Larry Samuelson and Avner Shaked
94-14R "How Proper is Sequential Equilibrium?" by George J. Mailath, Larry Samuelson and Jeroen M. Swinkels
94-15 "Common p-Belief: The General Case" by Atsushi Kajii and Stephen Morris
Revised and final version appears in Games and Economic Behavior 18, 73-82
94-16 "Impact of Public Announcements on Trade in Financial Markets" by Stephen Morris and Hyun Song Shin

94-17 "Payoff Continuity in Incomplete Information Games and Almost Uniform Convergence of Beliefs" by Atsushi Kajii and Stephen Morris

94-18 "Public Goods and the Oates Decentralisation Theorem" by Julian Manning

94-19 "The Rationality and Efficacy of Decisions under Uncertainty and the Value of an Experiment" by Stephen Morris and Hyun Song Shin
Revised and final version appears in Economic Theory 9, 309-324

94-20 "Does Rational Learning Lead to Nash Equilibrium in Finitely Repeated Games?" by Alvaro Sandroni

94-21 "On the Form of Transfers to Special Interests" by Stephen Coate and Stephen Morris
Revised and final version appears in the Journal of Political Economy 103, 1210-1235

94-22 "Specialization of Labor and the Distribution of Income" by Akihiko Matsui and Andrew Postlewaite

95-01 "Financial Innovation and Expectations" by Alessandro Citanna and Antonio Villanacci

95-02 "An Economic Model of Representative Democracy" by Tim Besley and Stephen Coate

95-03 "The Revelation of Information and Self-Fulfilling Beliefs" by Jayasri Dutta and Stephen Morris
Revised version appears in Journal of Economic Theory 73, 231-244

95-04 "Justifying Rational Expectations" by Stephen Morris

95-05 "Co-operation and Timing" by Stephen Morris

95-06 "Statistical Discrimination, Affirmative Action, and Mismatch" by Jaewoo Ryoo

95-07 "Sufficiently Specialized Economies have Nonempty Cores" by Roger D. Lagunoff

95-08 "Necessary and Sufficient Conditions for Convergence to Nash Equilibrium: The Almost Absolute Continuity Hypothesis" by Alvaro Sandroni

95-09 "Budget-constrained Search" by Richard Manning and Julian Manning

95-10 "Efficient Policy Choice in a Representative Democracy: A Dynamic Analysis" by Timothy Besley and Stephen Coate

95-11 "The Sequential Regularity of Competitive Equilibria and Sunspots" by Atsushi Kajii

95-12 "Generic Existence of Sunspot Equilibria: The Case of real Assets" by Piero Gottardi and Atsushi Kajii

95-13 "Speculative Investor Behavior and Learning" by Stephen Morris

Revised and final version appears in <u>Quarterly Journal of Economics</u> **111**, 1111-1133.

95-14 "Incorporating Concern for Relative Wealth into Economic Models" by Harold L. Cole, George J. Mailath and Andrew Postlewaite

95-15 "An 'Anti-Folk Theorem' for a Class of Asynchronously Repeated Games" by Roger Lagunoff and Akihiko Matsui

95-16 "Correlated Equilibria and Local Interactions" by George J. Mailath, Larry Samuelson and Avner Shaked

95-17 "A Rudimentary Model of Search with Divisible Money and Prices" by Edward J. Green and Ruilin Zhou

95-18 "The Robustness of Equilibria to Incomplete Information*"by Atsushi Kajii and Stephen Morris

Revised and final version forthcoming in <u>Econometrica</u>.

95-19 "Policy Persistence " by Stephen Coate and Stephen Morris

95-20 "Underemployment of resources and self-confirming beliefs*"by Alessandro Citanna , Herve Cres + and Antonio Villancci

96-01 "Multiplicity of Equilibria" by Christian Ghiglino and Mich Tvede

96-02 "Word-of-Mouth Communication and Community Enforcement" by Illtae Ahn and Matti Suominen

96-03 "Dynamic Daily Returns Among Latin Americans and Other Major World Stock Markets" by Yochanan Shachmurove

96-04 "Class Systems and the Enforcement of Social Norms" by Harold L. Cole, George J. Mailath and Andrew Postlewaite

96-05 "Dynamic Liquidation, Adjustment of Capital Structure, and the Costs of Financial Distress" by Matthias Kahl

96-06 "Approximate Common Knowledge Revisited" by Stephen Morris

96-07 "Approximate Common Knowledge and Co-ordination: Recent Lessons from Game Theory" by Stephen Morris and Hyun Song Shin

Revised and final version appears in <u>Journal of Logic, Language and Information</u> 6, 171-190.

96-08 "Affirmative Action in a Competitive Economy" by Andrea Moro and Peter Norman

96-09 "An Alternative Approach to Market Frictions: An Application to the Market for Taxicab Rides" by Ricardo A. Lagos

96-10 "Asynchronous Choice in Repeated Coordination Games" by Roger Lagunoff and Akihiko Matsui

97-01 "Contagion" by Stephen Morris

97-02 "Interaction Games: A Unified Analysis of Incomplete Information, Local Interaction and Random Matching" by Stephen Morris

97-03 "The Premium in Black Dollar Markets" by Yochanan Shachmurove

97-04 "Using Vector Autoregression Models to Analyze the Behavior of the European Community Stock Markets" by Joseph Friedman and Yochanan Shachmurove

97-05 "Democratic Choice of an Education System: Implications for Growth and Income Distribution" by Mark Gradstein and Moshe Justman

97-06 "Formulating Optimal Portfolios in South American Stock Markets" by Yochanan Shachmurove

97-07 "The Burglar as a Rational Economic Agent" by Yochanan Shachmurove, Gideon Fishman and Simon Hakim

97-08 "Portfolio Analysis of Latin American Stock Markets" by Yochanan Shachmurove

97-09 "Cooperation, Corporate Culture and Incentive Intensity" by Rafael Rob and Peter Zemsky

97-10 "The Dynamics of Technological Adoption in Hardware/Software Systems: The Case of Compact Disc Players" by Neil Gandal, Michael Kende and Rafael Rob

97-11 "Costly Coasian Contracts" by Luca Anderlini and Leonardo Felli

97-12 "Experimentation and Competition" by Arthur Fishman and Rafael Rob

97-13 "An Equilibrium Model of Firm Growth and Industry Dynamics" by Arthur Fishman and Rafael Rob

97-14 "The Social Basis of Interdependent Preferences" by Andrew Postlewaite

4