1 The New Social Economics

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This volume surveys recent efforts to study an old problem: the interrelationship between group and individual behavior. A distinguishing feature of this new research is that it melds together ideas that have traditionally been pursued separately in economics and sociology. Sociology brings to this endeavor a rich conceptualization of the role of social influences on individual preferences and cognition. Economics provides methods that allow one to model aggregate behavior formally as the outcome of individual decisions when these decisions are made interactively. Hence we do not regard it as an exaggeration to say that this volume represents a survey of an emerging social economics. This new social economics, we believe, holds the promise of providing new insights into social and economic dynamics through the explicit study of the interactions that link individual behavior and group outcomes.

The starting point for analyses in social economics is the assumption that individuals are influenced by the choices of others. Because people typically make choices sequentially, a feedback loop exists from past choices of some people to future choices by others. The resulting dynamical system is the object of study. To make this program concrete, we need to address several methodological questions. First, we need to articulate what aggregate properties of this system we are interested in studying. Second, we need to maintain the individuality of the subjects at all times, so that the behavioral rules apply to individuals rather than to representative agents, averages, and the like. Third, we need to know how people respond to their beliefs concerning the characteristics and behaviors of others. Fourth, we need to specify how these beliefs are formed. This depends, in turn, on the ability of individuals to learn, reason, and process information. Fifth, we need to allow for random perturbations that may arise from variations in the environment, errors in the transmission of information, and heterogeneity in individual responses.

The combination of these elements yields a stochastic dynamical system whose aggregate properties we wish to study. Typically such a system will exhibit very complicated behavior that is often far from a steady state; in this sense alone, social dynamic models have a different “look and feel” than more standard modeling approaches in economics. But the dissimilarities do not end here. Since we insist on maintaining the individuality and heterogeneity of agents in the description of the system, the dimensionality of the state space that describes the system can be gigantic. This limits our ability to fully characterize the behavior of the process. Instead, the objective of analysis is the identification of aggregate or long-run properties that can be tracked in spite of the system’s unwieldy size. A variety of analytical methods exists for accomplishing aspects of this, drawn from statistical mechanics and the theory of stochastic processes with large deviations. Computer simulations complement the analytical approaches by allowing the study of intermediate-term behavior of large-dimensional systems, as illustrated in Axtell, Epstein, and Young (chapter 7).

As an example of how these elements fit together, consider the dynamics of residential segregation, a problem first studied by Thomas Schelling (1971). Schelling’s model was designed to elucidate the conditions under which individual decisions about where to live will interact to produce neighborhoods that are segregated by race. His model shows that this can occur even though individuals do not act in a coordinated fashion to bring about these segregated outcomes. Notice that in posing the question in this way, we have already identified the macroscopic property—the degree of segregation—that we propose to study. The object of the analysis is to explore how (and whether) this property can result from the uncoordinated, self-interested decisions of many individuals. Schelling proposed a prototype model in which individual agents are of two types, say red and blue, and are placed randomly on the squares of a checkerboard. The *neighborhood* of an agent is defined to be the eight squares adjoining his location. Each agent has preferences over the composition of his neighborhood, defined as the proportion of reds and blues. In each period, the most dissatisfied agent moves to an empty square provided a square is available that he prefers to his current location. The process continues until no one wants to move.

This is one of the earliest examples of a social dynamics model in the sense described above. First, the object of the exercise is to determine what patterns of integration or segregation emerge from decentralized decision making. Second, individual agents are modeled as making decisions about where to move given their preferences over neighborhood composition and their beliefs about neighborhood characteristics. The individuality of agents is maintained throughout—each has a particular location and set of preferences. Third, agents care about the actions of others, namely, where others choose to live. Fourth, information is transmitted via a neighborhood structure, that is, through an exogenously determined geography. Fifth, each agent is myopically rational. He does not optimize given his beliefs about the future course of the process; rather, he simply chooses among the best available alternatives in the current period. Finally, the order in which agents make decisions is random.

Schelling did not analyze this model rigorously but simulated its behavior through repeated trials from different initial conditions. Young (chapter 5) shows how to analyze the asymptotic behavior of a variant of the model using the concept of a stochastic potential function. Moreover, this analytical approach shows that Schelling's intuitions and simulation results can be rigorously justified: with high probability, the system will reside in a state such that agents are almost completely segregated by type. Furthermore, this is true even if *all* agents would prefer to live in integrated neighborhoods. In other words, this is a system in which the pursuit of self-interest leads to outcomes that are socially suboptimal, due to the externalities created by the individual location decisions.

This example illustrates the distinctive features of social dynamics as we have defined them. To see how these insights can be embedded in a formal model, let us proceed as follows. Assume that I agents are situated in a social or geographic space that determines lines of communication and degrees of social influence. In particular, we suppose that each agent is situated at the vertex of a directed graph, and that each directed edge (i, j) is weighted by its importance, say $d_{i,j}$, which we take as nonnegative. Each agent has a finite repertoire of X possible actions or behaviors, which are observable by others. A state of the system is a collection of actions by each agent, $\underset{\sim}{\omega}_t = (\omega_{1,t}, \ldots, \omega_{I,t})$, where $\omega_{i,t}$ is agent i's action at t. Each agent i is affected by the actions of others, so it is useful to define $\underset{\sim}{\omega}_{-i,t} = (\omega_{1,t}, \ldots, \omega_{i-1,t}, \omega_{i+1,t}, \ldots, \omega_{I,t})$. Over time, possibly randomly, agents reconsider what they are doing in the light of current circumstances and have the opportunity to alter their actions. Agent i's choice of actions is governed by i's personal preferences concerning actions, independent of what others are doing, plus the actions of others, weighted by their importance to i.

Formally, we may represent this situation as follows. Let $\underset{\sim}{\Theta}_i$ denote a vector of characteristics of i that influence his payoff from each possible action. In choosing an action $\omega \in X$, agent i receives a private payoff $\upsilon(\omega_{i,t}, \underset{\sim}{\Theta}_i)$ plus a social payoff $\sum_{j \neq i} d_{i,j} s(\omega_{i,t}, \omega_{j,t}, \underset{\sim}{\Theta}_i)$. Hence each actor makes a choice in order to maximize

$$U_i(\omega_{i,t}, \underset{\sim}{\omega}_{-i,t}, \underset{\sim}{\Theta}_i) = \upsilon(\omega_{i,t}, \underset{\sim}{\Theta}_i) + \sum_{j \neq i} d_{i,j} s(\omega_{i,t}, \omega_{j,t}, \underset{\sim}{\Theta}_i).$$

We could assume that each individual's choice is perfectly predicted from this maximization problem, but this would require perfect knowledge of the determinants of each actor's behavior. It seems more reasonable to model behavior as a random variable reflecting unobserved heterogeneity in the ways that people respond to their environments. A standard and analytically convenient representation is to assume that the logarithm of the probability that agent i chooses a particular action is a positive linear function of the action's expected utility, that is,

$$\log(\mathrm{Prob}(\omega_{i,t} | \underset{\sim}{\omega}_{-i,t}, \underset{\sim}{\Theta}_i)) = \beta U_i(\omega_{i,t}, \underset{\sim}{\omega}_{-i,t}, \underset{\sim}{\Theta}_i).$$

Here β is a sensitivity parameter: the larger β is, the less uncertainty there is in the agent's response. These are known in the literature as log linear response models (Blume 1993, 1995; McFadden 1981).

By varying the interaction weights $d_{i,j}$ one can analyze a rich variety of socioeconomic contexts. When people care only about the behavior of their near neighbors, then $d_{i,j} = 0$ except when i and j are "close" according to some notion of social distance (as in Schelling's model of preferences over neighborhood racial composition). In other settings, agents may be influenced by near neighbors as well as social aggregates. One such example is smoking, where the behavior of an agent's friends, ethnic group, and national age peer group may all influence individual choice.

One version of this framework is the Brock-Durlauf model, which deals with the case of binary choices. Agents choose either $\omega_i = -1$ or 1 based on maximizing

$$V_i(\omega_i, \underset{\sim}{\omega}_{-i}, \underset{\sim}{\Theta}_i) = \upsilon(\omega_i, \underset{\sim}{\Theta}_i) + E_i\left(\sum_{j \neq i} d_{i,j} s(\omega_i, \omega_j, \underset{\sim}{\Theta}_i)\right) + \varepsilon_i(\omega_i),$$

where $E_i(\cdot)$ is a function that represents agent *i*'s calculation of expected values and

$$\text{Prob}(\varepsilon_i(-1) - \varepsilon_i(1) \leq z) = \frac{1}{1 + exp(-\beta_i z)}; \qquad \beta_i \geq 0.$$

This assumption about the random utility term $\varepsilon_i(\omega_i)$ in the individual decision problem yields the log linear probability structure we have described. Notice that in this model, agents are not assumed to know the actual behaviors of others. Rather, they form expectations about them and act accordingly. This seems particularly natural when the population is large. In chapter 2 Blume and Durlauf discuss this and related models and show how these models often have multiple equilibria that depend on the relative strength of the individual and social components of the payoffs.

Suppose that agents are now allowed to update their choices at random times whose occurrences are governed by independent Poisson processes. One then obtains a *social dynamic* whose properties can be studied using a combination of stochastic dynamical systems theory and simulation techniques. In particular, one obtains a theory of social norms and customs (Young 1993, 1998).

What Phenomena Are We Trying to Explain?

The new social economics has been used in studies of a wide range of phenomena. One area falls under the general rubric of social pathologies such as crime (Case and Katz 1991; Glaeser, Sacerdote, and Scheinkman 1996; Glaeser and Scheinkman, chapter 4), teenage pregnancy and high school dropout rates (Crane 1991), and cigarette smoking (Jones 1994; Krosnick and Judd 1982), among others. The contribution of the new social economics to the understanding of these phenomena is its explicit analysis of the role of group-level influences in determining these behaviors.

Group-level influences imply far different properties for populationwide behavior than found in more conventional models. As illustrated by Durlauf (1997) and Brock and Durlauf (2000a), for example, peer group influences can induce multiple equilibria in average community behavior. Hence the interdependences induced by the desire to conform to one's peers can lead to very different aggregate behaviors for communities of apparently identical individuals. Alternatively, as described by Glaeser and Scheinkman (chapter 4), intragroup interactions can induce intergroup heterogeneity. Such interactions can have powerful effects on individuals. For example, interactions in education may lead to persistent inequality, when economic segregation of neighborhoods means that different students experience different role model and peer influences (Bénabou 1993, 1996; Durlauf 1996a, b).

To give a sense of how these models have the potential to provide explanatory power for empirical phenomena, consider the case of teenage smoking. As exhaustively documented in a U.S. Department of Health and Human Services (1998) report, substantial differences exist in smoking rates among teenagers of different ethnic groups and genders. It is difficult to see how an explanation of smoking behavior that relies solely on individual and family background measures, or even on regional smoking differences (which might well be due to interactions) can explain differences along both of these dimensions simultaneously. For example, gender differences cannot be readily attributed to differences in family income or educational levels. Some evidence of social interactions as an explanation of racial differences is found in Krauth (1999), although a full investigation of the role of interactions in demography of smoking patterns has yet to be accomplished.

Social pathologies are an example of a broader class of socioeconomic phenomena in which the distribution of individual characteristics of a population fail to uniquely specify its aggregate behavioral characteristics. Intuitively, when individual decisions depend on the decisions of others, there is indeterminacy in what the population as a whole actually does. Interdependence implies only that whatever the members of the population do, they behave relatively similarly. In turn, this indeterminacy introduces a role for history, conventions, and social norms in understanding both short-run and long-run socioeconomic phenomena—a role that is typically absent in neoclassical economic models.

One context where social influences seem likely to be important is demography. As described in Mason (1997), while the pattern of fertility transitions across countries is arguably the most important phenomenon in understanding world demography, no single theory has proven particularly successful in explaining the heterogeneity in national demographic experiences. Mason goes on to argue that an understanding of demographic transitions is emerging only through the combination of economic and cultural explanations. While Mason interprets this understanding as requiring the abandonment of a single theory, such a combination is precisely what can be achieved in models with interactions, a claim made in Dasgupta (1995) and Durlauf and Walker (1998). In the context of the basic model we have described, private economic incentives manifest themselves in the private utility term whereas cultural influences can be conceptualized in the context of the social utility term. Empirical evidence in support of this claim has been found by Kohler (1997), Montgomery and Casterline (1996), and Munshi and Myaux (1998).

While systematic work has yet to be done, there are many other areas where we would speculate that interaction effects are important. One area, discussed by Blume and Durlauf (chapter 2) is dialect use. Sociolinguistics has demonstrated, for example, that the use of nonstandard syntax and pronunciation is partially predictable from the socioeconomic background of a speaker (Chambers 1995). Similarly, ethnic and regional dialects in the United States have proven to be remarkably resistant to convergence even in the presence of homogenization of language in radio and television (McWhorter 1998). These facts are strongly indicative of the importance of language in expressing identity, with ramifications for how an individual's peer group is determined and what social norms he regards as salient. By implication, the evolution of dialect variation can be formalized through the modeling of an interacting, heterogeneous population.

Another area of possible application is democracy. As seems clear in cases ranging from ancient Athens to the United States to postcommunist Russia, the success or failure of democratic institutions can only be understood if, in addition to formal procedures, one understands the political norms that condition individual behavior. In the case of Athens, it is remarkable that democratic institutions were so stable during the Peloponnesian War in the face of plague, military catastrophe in Sicily, and eventual defeat and occupation by Sparta (Finley 1983; Ober 1991, 1996). For the United States it has been argued that the supremacy of democratic values was not produced instantaneously by the American Revolution, but rather evolved through the general broadening of the conception of what rights adhered to all citizens (Wiebe 1995). (It is often forgotten that the universal franchise in the United States was not enshrined by the adoption of the Constitution but rather emerged during the 1800s, with adoption in all states associated with the "age of Jackson" (Williamson 1960). Conversely, a number of commentators have attributed the failings of nascent democracy in Russia to the absence of democratic values and norms of behavior (Hough 1998; McDaniel 1996; Steele 1994). Such a perspective is consistent with Putnam's (1993) work on civic institutions in Italy, which has provided strong evidence of the role of culture in determining the success or failure of democratic institutions. Indeed, a critical feature of the design of formal democratic procedures is how they lead to the reinforcement of those norms necessary for democratic efficacy and stability.

As far as we know, there has yet to be any formal modeling of the evolutionary dynamics of democratic norms and institutions in which democracy is valued as an intrinsic good,[1] although there is of course a rich qualitative literature on these issues. The other side of this question is the identification of those conditions under which a social contract may break down. Binmore (chapter 8) presents a framework for studying the relative stability of various social contracts when these contracts are viewed as equilibria in which individual behaviors adhere to some cooperative norm. Bowles (chapter 6) complements this type of analysis by describing how preferences can evolve that undergird cooperative behavior, drawing on group selection arguments from evolutionary biology. We believe that the arguments in Binmore's and Bowles's chapters, and more generally the methods discussed throughout this book, could provide a basis for the development of formal models of democracy that may even be amenable to statistical analysis.

Empirical Evidence

Although there are a number of statistical analyses that have produced evidence of group-level influences on individual behavior (see Brooks-Gunn et al. 1993; Corcoran et al. 1992; and Crane 1991 for well-known examples and Moffitt, chapter 3 for discussion), the question of empirical evidence on interactions is currently quite controversial (Brock and Durlauf 2000b and Manski 1993).

One reason for controversy concerns data quality. It is relatively rare that a researcher knows a priori which groups influence an individual, or (if these groups consist of a small network as opposed to a large community) what the characteristics of the relevant groups are. Second, there is the related question of how to distinguish group influences from unobserved individual effects. Consider the possibility that growing up in a ghetto reduces one's life prospects, conditional on one's parents' characteristics. The problem is that residence in a ghetto is at least partially determined by one's parents characteristics. Unless these characteristics are fully controlled for, a statistical correlation between individual outcomes and ghetto membership may occur if there are parental characteristics that are unobservable to the researcher.

One approach to overcoming the issues of group measurements and unobserved individual characteristics is the use of "natural experiments" to identify group effects. In a natural experiment, a researcher identifies two populations of individuals with initially similar characteristics, one of which has been subjected to an exogenous change of neighborhood. Differences in the outcomes for the two populations thus become a measure of group effects.

The best known of these experiments is the Gautreaux program, which has moved a number of disadvantaged families out of inner-city Chicago to adjacent suburban communities. As documented by Rosenbaum and Popkin (1991) and Rosenbaum (1995), movement to suburbs had strong positive effects on high school dropout rates and post–high school wages. Some aspects of these studies have been questioned, in particular the extent to which individuals who experience changes of groups are randomly selected. Nevertheless, this literature adds to the overall evidence that interactions matter. Further, the Moving to Opportunity Demonstration, currently being conducted by the Department of Housing and Urban Development (see Goering 1996 for details), will replicate a Gautreaux-type experiment with stricter attention to randomization of the neighborhood changes and so might resolve some of these concerns. Preliminary evidence on Moving to Opportunity may be found in Katz, Kling, and Liebman (1997) and Ludwig, Duncan, and Hirschfield (1998).

Additionally, evidence supportive of interactions has been accumulated in detailed studies that have gathered data on individuals and their circles of peers. Steinberg (1996) does this through the use of detailed time diaries for high school students. The importance of peer group influences is clear in their data. In a very different example, Moskos and Sibley (1997) have argued that the U.S. Army provides a unique environment for African Americans. What makes this environment unique is the very stringent set of penalties for discriminatory behavior by soldiers or officers and the relative large leadership role of blacks in the army when compared to civilian society. As an illustration of the effects of participation in army life, Moskos and Sibley (1997) look at attitudes towards O. J. Simpson's guilt—a question where differences of opinion have been widely treated as evidence of an unbridgeable racial gulf in the United States. In a July 1994 Gallup poll, 68 percent of all whites thought Simpson definitely or probably guilty, whereas only 24 percent of all blacks did, while 15 percent of all whites thought him definitely or probably innocent whereas 60 percent of all blacks believed this. Moskos and Sibley found, on the other hand, that among black soldiers, 48 percent considered Simpson likely guilty and only 29 percent considered him likely innocent. Moskos and Sibley demonstrate that such differences in attitudes between black soldiers and the black population as a whole are reflected across a wide range of attitudes toward society. While membership in the military is of course not randomly determined, these authors make a compelling case that the military environment is causally responsible for these attitudinal differences.

Even in those cases where the data are of sufficiently high quality to overcome these problems, there are issues of identification. As discussed in Manski (1993), ideally one would like to distinguish between three effects in understanding why members of a group behave similarly: correlation of individual characteristics, influences of group characteristics on individuals, and feedbacks of group behavior onto individual behavior. Distinguishing these effects may be problematic because of the dependence of a group's behavior on a group's characteristics. Moffitt (chapter 3) illustrates this difficulty using a simple simultaneous equations model in economics. Excessive pessimism concerning the possibility of identification of social determinants of individual behavior is not, however, warranted. Brock and Durlauf (2000b) provide a relatively general framework for understanding when identification of interaction effects can and cannot be achieved. Interestingly, the endogeneity of groups may well facilitate identification of social determinants, as it introduces nonlinearities and instrumental variables that facilitate estimation of the behavioral process. Young (chapter 5) shows how endogenous selection and conformity, while distinct processes, can both be modeled using stochastic process techniques that are amenable to empirical analysis. Continued work in this area is a high priority.

Finally, there is the question of how to relate various types of social economics models to data. The econometric approaches we have been discussing may be interpreted as estimating the parameters of various specific structural models of interactions (Brock and Durlauf 2000b). These models are relatively simple in terms of the degree of heterogeneity they permit with respect to individual actors as well as the way in which agents are interconnected. Glaeser and Scheinkman (chapter 4) provide alternative ways of uncovering interactions through the use of cross-group variability. The idea here is that conformity effects can lead to differing behaviors across otherwise identical groups.

An alternative to analytical modeling is the use of computer simulations to study various socioeconomic environments. A key advantage of the simulation approach is the richness of the environments which may be modeled—see Axtell, Epstein, and Young (chapter 7) and Epstein and Axtell (1996) for examples. An outstanding question is how to relate these models to data.

Concluding Comments

The chapters in this volume illustrate some of the insights offered by the new social economics. The hallmarks of this approach are, first, to explicitly model a socioeconomic system as a collection of heterogeneous individuals. Second, individuals interact directly as well as through prices generated by markets. Peer groups, social networks, role models, and the like have a prominent place when it comes to determining individual behavior. Third, individual preferences, beliefs, and opportunities are themselves influenced by the interactions that characterize the system. Fourth, the analysis of such processes draws from methods in stochastic dynamical systems theory, supplemented by large-scale simulation techniques.

As a nascent field, it is unsurprising that there is a great deal left to accomplish. A particular challenge is the fuller integration of theoretical and empirical work. While there have been steps in this direction, many of which are reported in this volume, much remains to be done. What we hope is that this book brings a richer view of human behavior and human interactions to the analysis of economic phenomena.

Note

1. In contrast, there is a recent literature that studies the emergence of democracy in the context of conflicts over resource allocation. In models of this type, political power is sought by various groups in order to determine the distribution of economic resources through mechanisms such as taxes. An elite that monopolizes power may voluntarily democratize in order to avoid the cost of revolutionary conflict. See Acemoglu and Robinson (1998) for an example.

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