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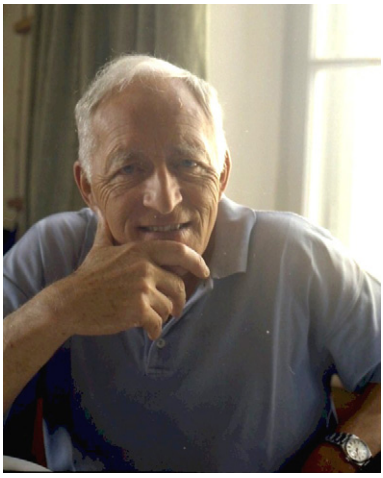
Editorial

Alan Kirman: A non-representative economist



This issue collects papers presented at the conference "Networks, Aggregation and Markets" that was held in Marseilles on 20–21 June 2005, in honor of Alan Kirman, under the sponsorship of GREQAM and IDEP. When we first thought of organizing a meeting and a publication that would pay tribute to Alan and to his research, we realized that gathering an approximately coherent collection of papers would not be easy. We could not do it simply by inviting contributions from all those who have collaborated with Alan over the years, friends, students and co-authors. There was first of all the problem that the set is too large: according to Alan's website, 30 students have completed their PhD under his supervision, and we have counted more than 50 co-authors. But more than that, the true difficulty is the variety of Alan's interests along his scholarly career. There would have been works in international trade, the field in which Alan wrote his thesis under Harold Kuhn; general equilibrium theory; social choice theory; fairness; coalition formation; the elusive quest of a representative agent; speculative bubbles and financial markets; information and learning, ants, wholesale markets for fish, fruits and vegetables; networks; ranking of economic departments; economic identity; and we are undoubtedly forgetting a few.

Such a cocktail would not have been easily assimilated, but more importantly, some parts of it would not have been faithful to Alan's current taste. One of the remarkable traits of Alan's intellectual evolution is that, having started from the very heart of mainstream economics, he has

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moved towards a progressively more critical position, exploring the limits of economic analysis. Indeed, his early role in developing mainstream economics gives special weight to his critique. Alan knows what needs to be challenged.

Given the multiple selves shaping Alan's identity, we chose to please the self that seemed dominant at the time we planned the conference, and to focus on markets' interactions and aggregation. His website states: "my main interest is in the way in which markets function and the link between micro and macro behavior. As soon as we take into account the direct interaction between agents, the relation between individual actions and aggregate outcomes becomes very complex. Economic activity is better viewed as the product of a complex self-organizing system than as corresponding to the behavior of an individual maximizer". This then is the topic of the current issue.

Alan began his career at CORE, extending the beautiful construction of Walrasian general equilibrium in articles in mainstream journals. A fairly large number of students in the world have learnt general equilibrium from Hildebrant and Kirman's (1976) "Introduction to Equilibrium Analysis" (or its more recent 1988 edition). A distinctive feature of this textbook is its insistence on the set of allocations that are not blocked by any subcoalition of individuals, the core. The paper by Page and Wooders in this issue is an echo of Alan's interest in the core, here applied to a dynamic model of network formation where players are farsighted and take into account the long run consequences of their membership decisions.

An important direction in which Alan extended the concept of the core is by considering communication between agents to be random; the admissible coalitions are then stochastic and thus so is the core of an economy. By representing the economy through a stochastic graph, Kirman et al. (1986) prove stochastic versions of the equivalence result between Walrasian allocation and the core when communication is limited. We find a natural example of such a limitation when two persons do not speak the same language. The benefits generated by learning a language are positively correlated to the number of other individuals who know it too. The paper by Ginsburgh et al. is one of a small number of recent works that introduce the formal consideration of incentives into the decision to acquire a foreign language and test the results on data from different European countries.

The research area where microeconomics and macroeconomics come together is one of the most fascinating areas of economics, even if it poses particularly difficult challenges. In the mid seventies, the Debreu–Mantel–Sonnenschein result came as a shock to general equilibrium theorists. It taught us that aggregating individual excess demand functions into aggregate excess demand functions does not guarantee that the properties of the former are preserved, in particular that the functions are downward sloping with respect to prices. The complexities of the aggregation problem make the insistence on simple microfoundations for macroeconomic analysis appear naïf. The theorem was proved in a context where agents are allowed to be heterogeneous, but Kirman and Koch (1986) later showed that the Debreu–Mantel–Sonnenschein result continues to hold when all individuals have identical but not homethetic preferences and different endowments. In the absence of restrictive assumptions, translating individual behavior into macroeconomic regularities relies on the existence of a representative agent. Over the last 30 years, Alan Kirman has not stopped warning the economics profession of the weakness of this solution. He has matched his passionate attacks (for example, Kirman, 1989 and 1992) with constructive suggestions for research partially inspired by models and tools borrowed from other sciences. Alan advocates a route where "the behavior of the group cannot be inferred from analyzing one of the identical individuals in isolation. Without taking explicit account of the interaction between individuals, the group behavior observed during the experiment cannot be explained" (Kirman, 1992).

The insistence on interactions is the recurring theme of Alan's second phase. It is a remarkable development, when we take into account that Alan's point of departure, general equilibrium theory, is posited on the anonymity of individuals who meet through the price system. Alan has a view of human activity more familiar to sociologists, enriched by the rigor of his general equilibrium days and a methodology that borrows freely from physics. His most influential works in this line are his attempts, with several co-authors, to model and understand the wholesale fish market of Marseilles, clearly viewed as paradigm of "the market" (Kirman and Vignes, 1991; Härdle and Kirman, 1995; Weisbuch et al., 2000; Kirman and Vriend, 2001). The availability of detailed data makes concrete and immediate what was until now in Alan's work a purely theoretical problem. The puzzle at the center of the analysis is the observed violation of the law of one price: the same product was sold at different prices to different buyers. In Weisbuch et al. (2000) and Kirman and Vriend (2001), Alan and his co-authors document that many buyers tend to remain faithful to one or few sellers, suggesting that long-term personal relationships play some role in individuals' willingness to tolerate fluctuations and dispersion in prices. The underlying micro relationships have more in common with personalized networks than with anonymous market behavior.

Several papers in this issue address the emergence of sustained social connections in mitigating or distorting pure market considerations. Ioannides and Soetevent propose a model of endogenous network formation where individuals are affected not only by the average behavior in the entire group (the economy) but also by their immediate neighbors. Bramoullé and Kranton study the emergence of endogenous networks when risk sharing within the connected group buffers income uncertainty. Both types of behavior are likely to be present in the Marseille fish market. We read in Weisbuch et al. (2000): "The essential risk [. . .] for a buyer is not that of paying too high a price but rather of not being served at all. [. . .] Such stable trading relationships are also profitable to sellers who can then predict with some accuracy the demand they will face in each session and determine their supply accordingly."

The dynamic behavior of the network is a difficult and important question, calling attention to learning. Weisbuch et al. (2000) and Kirman and Vriend (2001) propose two models of consumers' learning with a reinforcement mechanism where individuals use simple rules of thumb with no strategic thinking. In the first paper a buyer chooses whether to remain faithful to a particular seller on the basis on the cumulative history of returns from their bilateral relationship, relative to the returns experienced by other buyers. As a result, two distinct classes of buyers coexist within the same market: loyal buyers who remain with the same seller, and searchers who wander from seller to seller, as indeed observed in the Marseille fish market. In the second paper, each pair of traders knows only their own common history, but the set of decisions available to each of them is larger: choice of seller and quantity demanded for buyers, pricing to individual buyers and order of service for sellers.

Alan's interest in learning is long-lasting. He published an intriguing paper on firms' learning about demand conditions more than 30 years ago (Kirman, 1975). He proposed an adaptive mechanism in which firms update their beliefs through Bayesian updating and showed that they can converge to the wrong model parameters. This result, reiterated in Kirman (1983) remains challenging. In a dynamic duopoly model, Ed Hopkins' paper in this issue shows that differences in learning rules can have dramatic effects on market outcomes. In a model where two firms offer competing products of different but unknown quality, Hopkins shows that consumers can lock into the habit of purchasing inferior goods under reinforcement learning, but not, in this model, under belief learning.

The question of aggregation takes a surprising turn in Härdle and Kirman (1995): not only is it difficult to translate individual laws of behavior into well-behaved aggregate variables, but the

opposite is also quite possible. As argued originally by Becker, rules of individual behavior that we do not quite understand, that may be complicated or conceivably random, can result in simple and predictable aggregate order. Using non-parametric techniques and again data from the Marseille fish market, Härdle and Kirman show that demand curves that are not in general downward-sloping at the individual level become downward-sloping when aggregated over the entire market. The main insight here, common to much of Alan's work since his studies of the fish market, is that regularities are generated by aggregation rather than derived from individual behavior. A second well-known example is Alan's model of ants' behavior (Kirman, 1993), an effective parable of consumers or investors' choices in markets. When faced with two identical food sources, at any given time most ants privilege one of the two, but switch between them at random intervals. Alan builds a simple recruitment model in which, when two ants meet, one converts the other to its own preferred food source with some probability; with an additional but arbitrarily small probability, any ant may switch food source exogenously. The model never settles into any long-run steady state, if not probabilistically. For plausible parameter values, at any point in time the ants are most likely to be favoring one of the two food sources, but it could be either of the two. Again, the simple, almost mechanic rule of behavior at the individual level translates into a rich aggregate equilibrium, a plausible model of fads and fashion and, Alan argues, of financial bubbles.

Schelling's tipping model of residential choice is another very elegant example of the same approach: simple rules of individual behavior resulting in unexpected aggregate regularities. In Schelling's model two types of agents choose where to live on a two-dimensional lattice, with the only constraint that each agent desires that at least half of his immediate neighbors should be of his own type. If agents are allowed to switch place with others, a highly segregated pattern of residential location emerges. In this issue, Fagiolo et al. extend Schelling's model beyond its original formulation and test it on six different graph structures. Simulations show that segregation continues to occur in all six of the graphs. A different but related result on the robustness of residential segregation emerges from the paper by O'Flaherty and Sethi, where segregation is the outcome of geographic differences in robbery rates, even when individuals are indifferent to the racial composition of their neighborhoods. In the different context of social mobility, the paper by Cowan and Jonard reaches a conclusion with similar flavor; it proposes a model where a hierarchical structure emerges and is preserved across dynasties, even though social mobility is driven purely by meritocratic principles.

In a recent paper with Vinkovic (Vinkovic and Kirman, 2006), Alan and his physicist co-author provide a mathematical link between Schelling's socio-economic model of segregation and the physics of clustering. More precisely, the paper shows the strong parallels between the structure of Schelling's model and models used by physicists to study surface tension in liquids. Again, the paper reiterates one of the central lessons from Alan's body of work: in order to understand how to go from the microeconomic level to a global behavior, we can and should borrow the insights of different disciplines. The final result is a richness of different metaphors, which, together, begin to form an orderly picture of an extraordinarily difficult problem. The fish market, the ants, the physics of surface tension, all contribute to our understanding of human interactions and their aggregate consequences.

Alan's collaboration with physicists has been recurrent over the years, and the tools of statistical physics in particular have been among Alan's own favorite tools. Econophysics models are represented in this issue by Weisbuch and Battiston's paper. The paper studies a model where firms are connected through supply chains and investigates how local failures (isolated failures to produce or deliver) can either spread to the system or give rise to localized concentrations of economic activity.

An additional research methodology that has been used fruitfully in the study of aggregation is agent-based computational economics, employed by Alan, for example, in his paper with Vriend. An agent-based system is composed of a large number of individual agents who interact directly or through the modification of their common environment. The model is a description of the basic social entities of the system, their interactions and the typically simple rules that govern them. The repeated simulation of actions and learning leads to a global behavior. The objective is to describe the system's dynamics, and the focus is explicitly on the richness that derives from the large number of agents rather than on individual maximizing behavior. The paper by Russo et al. in this issue is an illustration of this approach; it is an agent-based model of a simple economy, with a homogeneous consumption good market and a labor market where a large number of heterogeneous firms and workers interact through randomly determined decentralized trades and update their choice variables according to specific routines. Russo et al. show that the model is able to reproduce several macroeconomic and distributive regularities of the real world.

Alan, all your colleagues gathered here are very happy to offer you this special issue. We hope that you will enjoy it. We thank JEBO for having accepted it under the usual peer review system. Alan was there at the beginning, when the journal was first conceived, and his work is closely related to the unconventional, interdisciplinary approach that JEBO has sponsored over the years. No other home would have been more fitting.

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