ECONOMICS

Markets and Where They Came From

Eric Maskin

There must be dozens of introductory books with the word "microeconomics" in the title, but for ambition alone Samuel Bowles's volume stands out. Not only does Bowles convey the elements of the conventional theory of capitalist economics (albeit in a far less systematic or detailed way than an ordinary textbook), he offers a wealth of cutting-edge material as well. In particular, *Microeconomics: Behavior, Institutions, and Evolution* gives exposure to recent experimental findings that call into question standard behavioral assumptions of economic theory (and generate modifications of these assumptions). It culminates by invoking these modifications along with evolutionary game-theoretic dynamics to explain how the institutions of capitalism came into being.

Microeconomics
Behavior, Institutions, and Evolution
by Samuel Bowles

Princeton University Press, Princeton, NJ, 2004. 598 pp. $49.50, £32.95 ISBN 0-691-09163-3. Roundtable Series in Behavioral Economics.

A standard axiom in economic theory holds that humans are self-interested: if given the choice between helping myself and helping you, I'll favor myself. Economists recognize, of course, that the assumption is not literally true. Many argue, however, that it is good enough for explaining most important economic phenomena. They also cling to it for methodological discipline: were the people in economic models allowed to care about matters other than their own welfare, then almost any behavior could be explained by the easy (but unilluminating) device of giving them a preference for that behavior, or so the fear goes. But Bowles notes that abandoning the self-interest axiom need not lead to complete theoretical permissiveness. The axiom can be replaced by other assumptions that narrow preferences fairly sharply. In any case, he contends that self-interest is a poor approximation of reality.

Bowles puts great weight on experimental results in "public-good" games as evidence for this conclusion. In a two-person version of such games, players are each given, say, $10, which they can then partially invest in a "public project." They choose what portion to invest and keep the rest of the money for themselves. Every dollar contributed to the project results in a $1.50 gross return, split equally between the players. Thus, if both invest their entire $10 in the project, they will each come away with $20 \times \$1.50 \times {}^{1}/_{2} = \$15$. Even so, notice that without some way to cooperate on investments, purely self-interested players should contribute nothing at all—they personally get back only $0.75 for each dollar they contribute (and they don't care about the $0.75 going to the other player). But this prediction is strongly refuted by experiments—subjects typically invest in the project about half the money they are given. Indeed, Bowles maintains that this sort of altruism is an important ingredient in the workings of modern economies.

Civic commerce. Detail from Ambrogio Lorenzetti's fresco *Effects of Good Government in the City* (1338–1340), Palazzo Publico, Siena, Italy.

How else, he asks, but by altruism can we plausibly explain why employees of large companies so often work harder when they own the company themselves? (Each employee is, in effect, participating in a public-good game: working harder to increase the value of the company is personally costly while almost the entire increase accrues to the other employee-owners.)

Yet Bowles goes still further. Not only are altruistic preferences needed for understanding modern economic behavior, they were, he contends, even more important in human prehistory—in particular, for the creation of the institution of private property. As conceived by Bowles, private property is cultural evolution's answer to the problem of wasteful conflict in human production and exchange. In his model, we imagine that there are three types of people (grabbers, sharers, and punishers) and that people are paired up at random to divide a "prize" (a product that the pair jointly produces). A pair of sharers divides the prize equally, as do two punishers, or a punisher-sharer pair. However, a grabber will take the entire prize when paired with a sharer and will fight over it when paired with another grabber. A grabber will also seize the prize from a punisher, who will then enlist fellow punishers to retaliate and wrest the prize back. (These three types correspond to stylized strategies in hunting and foraging interactions before the development of agriculture.)

Bowles shows that, in a dynamic setting (where types with relatively high payoffs, from repeated playing of a divide-the-prize game, proliferate and those with relatively low payoffs diminish in number), there are two limiting configurations toward which the population could evolve. In one—which Bowles calls a Hobbesian equilibrium—the punishers disappear, leaving only grabbers and sharers. In the other, more harmonious, configuration—a Rousseauian equilibrium—the grabbers vanish while punishers and sharers remain. Which configuration emerges depends on the starting point, but Bowles shows the Rousseauian equilibrium is much less stable—not as able to withstand "mutations" (i.e., shocks to the composition of the population)—and therefore less likely to persist over long periods of time.

This sets the stage for property rights. Imagine that each prize is located at a particular site and that there is a fourth type of people, "bourgeois," who behave like grabbers when they control the site (i.e., when they "own" the prize) and like sharers when the other person does. Bowles shows that a band of bourgeois can "invade" a population of grabbers and sharers (because bourgeois types derive higher payoffs from repeated interaction than do the other types) and ultimately drive the others out. Thus, property rights (and bourgeois types) came into existence as a way to avoid fighting and retaliation costs. Of course, such rights rely on the possibility of determining unambiguously who controls a site. This last fact helps explain why they seem not to have emerged before the rise of agriculture; as Bowles observes, it is easier to determine who has possession of cultivated land than of foraging territory.

The reviewer is in the School of Social Science, Institute for Advanced Study, Einstein Drive, Princeton, NJ 08540. E-mail: maskin@ias.edu

Published by AAAS

But there is a difficulty with this story: available evidence suggests that the transition to property rights followed a path from Rousseauian (not Hobbesian) equilibrium to bourgeois equilibrium. This is problematic for Bowles's theory because, as noted above, Rousseauian equilibrium and its high level of sharing are relatively fragile. (In particular, they are vulnerable to invasions by sufficiently large bands of grabbers.) One wonders how they survived through the many millennia before bourgeois equilibrium took over. Bowles responds to this difficulty by arguing that altruistic preferences offer a natural way to stabilize Rousseauian equilibrium: if sharing serves not only to avoid conflict but to gratify sharers, the Rousseauian configuration becomes more robust against invasion. Thus, Bowles suggests that altruism may have played a critical role in sustaining Rousseauian behavior in the ages preceding agriculture (and bourgeois types).

To assert that a game-theoretic model with just four strategies can adequately explain the genesis of property rights is bold if not brash, and Bowles acknowledges that his theory is at present only speculative. But, speculative or not, the theory is neat, thought-provoking, and highly original—as is much else in this most unusual take on microeconomics.

EVOLUTION

More Than Metaphorical Power?

Douglas H. Erwin

I began this review while returning from China, one of the world's fastest growing economies. Twelve years ago, when I first visited, China was just beginning to emerge from its economic torpor; today it consumes a majority of the world's cement production and appears to have cornered the world market on construction cranes. Far from a new phenomenon, China's economic strength harkens back to the 1700s when, as Kenneth Pomeranz and other economic historians have shown, China shared many of the advantages of Western Europe. So why did the modern world economy develop in Western Europe instead of China? What factors permit one society to gather the resources sufficient to develop a system that eventually comes to dominate other economies? This conundrum has challenged many historians, who have proposed explanations ranging from geography to environmental endowment and competing polities. In what he calls "an economic analysis of history," Geerat Vermeij, a noted paleontologist at the University of California at Davis, broadens these questions with a novel and intriguing yet at times problematic view of the history of life on Earth.

Nature
An Economic History
by Geerat J. Vermeij
Princeton University Press, Princeton, NJ, 2004. 461 pp. $35, £22.95. ISBN 0-691-11527-3.

Vermeij inquires into the processes that have driven the increased complexity of ecosystems through time as well as the relays of successive dominant groups. His view is that the crucial factor is power, by which he means the acquisition, retention, and use of energy per unit time. Vermeij argues that this same variable is ultimately responsible for success in both natural and human systems. The innovations propelling such successes require the control of sufficient resources to fuel the positive feedback that drives economic expansion. Whether Vermeij's concept of power is sufficient to explain this is the critical question.

Well aware that some will challenge his claim for the generality of an economic approach, Vermeij spends the early part of the book justifying his argument. Because I have long seen economics and economic history as a powerful source of metaphor, I take his point as read, but others may need more convincing. In his view, competition, inequality between units, adaptation, disturbance, trade, and imperfection characterize all economic systems, natural or human, on this planet or any other where life may exist. Vermiej has long advocated the evolutionary importance of escalatory feedbacks between predator and prey, so it comes as no surprise that predation and competition play pivotal roles in his account. Here he again rehearses the strategies of prey and predator, pointing out that the most successful predators exhibit speed, agility, the long-distance detection of prey, and the application of superior force—all reflections of greater power. As a result, competition for resources favors the success of groups with greater and greater power. Through time, such clades wield progressively more influence and replace groups that require fewer resources and less power.

Convincing the reader by the weight of example has a long and honorable tradition—Darwin used it to great effect in *The Origin of Species*. Taking the same approach, Vermiej supports his argument through insight and example by considering predator-prey dynamics, how organisms acquire power (e.g., increases in temperature, metabolic rate, size, and structural complexity), and the roles of nutrients, geography, and other environmental variables. The examples are fascinating, but the lack of quantification is troubling. Statistics were invented, as one wag has it, because the singular of data is anecdote. Selected examples do not allow us to determine whether the case being made is in fact general.

On some topics, the particular focus and lack of a firm quantitative framework lead Vermeij astray. For example, he claims that an oversupply of nutrients is widely held to be the cause of mass extinctions and lesser biotic crises. One wonders "by whom?", for if this was ever widely held it certainly is not today. Anoxia as the extinction trigger has been championed by Tony Hallam and Paul Wignall, but even if anoxia were a general feature of mass extinctions—which is far from clear—nutrient oversupply is not the only cause.

Vermeij is also particularly taken with the role of methane release in mass extinctions, and he discusses this at some length for the end-Permian extinction. Having pioneered this particular hypothesis a decade ago, I am all too aware that the latest, dramatically reduced estimates of the volume of gas hydrates make the case far more problematic than Vermeij would lead one to believe. Although it is easy to quantify estimates for methane release, Vermeij provides no quantitative grounding for his hypotheses. In the end, he argues for a "causal linkage" between massive flood basalts, extraterrestrial impacts, and methane release. Such a meaty stew may be intuitively appealing, but Vermeij provides no clue that most studies indicate that flood basalt eruptions are exceedingly unlikely to be induced by impactors smaller than several hundred kilometers in diameter (versus the 10- to 14-kilometer diameter of the object that triggered the Cretaceous-Tertiary mass extinction) and if any impact occurred at the Permo-Triassic boundary, it was an order of magnitude smaller than required.

Vermeij argues persuasively for the coconstruction of ecology and environment in the creation of power, and in this he is surely right. Others have recently addressed this issue as niche construction or ecosystem engineering, but process-based models remain rudimentary. Greater understanding of many of the patterns that Vermeij documents demands the development of such models and their testing against empirical data from the fossil record. Despite the limitations of Vermeij's approach, *Nature: An Economic History* is not a book easily dismissed. It offers a distinctive point of view and an insightful synthesis that promises to provide the basis of much future work.

The reviewer is at the Department of Paleobiology, National Museum of Natural History, Washington, DC 20560, USA, and the Santa Fe Institute, 1399 Hyde Park Road, Santa Fe, NM 87501, USA. E-mail: erwind@si.edu