Interview with Vernon L. Smith and associates

# Auctions, Market Experiments and Public Policy

A discussion with **PROFESSORS VERNON L. SMITH, STEPHEN RASSENTI** and **BART WILSON**

**How has experimental economics deepened our understanding of economic theory and its implications for public policy?**

**VERNON L. SMITH:** You can now ask policy-type questions in laboratory experiments which replicate markets in the real world. You can observe very important features of the market in action, and confirm or reconsider your ideas about how it will play out.

As an example of how we model economic behaviour, we like to conduct this double auction market experiment at our lectures where we ask 16 people from the audience to be eight buyers and eight sellers in a hypothetical market. Buyers are given values and sellers are given opportunity costs for each unit of the good. If the buyer is willing to pay $12 for a unit of the good and buys it for $9, he would make a profit of $3. Sellers make profits when they sell above their opportunity costs. We would reward the buyers and sellers with cash to motivate him. Buyers and sellers have no knowledge of each other's values and opportunity costs. The equilibrium exchange quantity of the experiment is sixteen and each seller should have been able to trade two of the four units that he can produce.

With some deviations within one or two units of the equilibrium quantity, it is common for prices to converge by the end of the first period. This happens even though the participants have never done economics before and do not understand economics and the concept of competitive equilibrium. It makes no difference in the ability of people to trade and make exchanges.

This competitive equilibrium can be achieved even in the absence of complete information. What really matters is private information and knowledge. Giving more public information on individual circumstances may make it worse, for example, in the case of posted pricing.

**In what ways have your market experiments been used to illuminate real-world problems?**

**SMITH:** Bart has also conducted experiments of petrol markets (sponsored by the Federal Trade Commission). Various policymakers in the US are pushing a ban on the refiner practice of setting different prices for petrol to petrol stations in different zones—a practice also known as zone pricing. The policymaker's intuition suggested that forcing refiners to charge the same price to all stations would distribute competition between the stations.

The objective of the experiments was to compare the possible outcomes between two types of market institutions: a market where refiners set different prices of petrol for petrol stations in different zones, and another market which had refiners charge the same price for all zones.

**BART WILSON:** The participants of these experiments were refiners and petrol station owners, and the computer robots were the buyers. Some stations were located near the corners of a grid and faced little competition. Others were clustered around the centre and competed with each other. So the buyers had different locations on the grid and they went out and bought from the different stations. It turned out that you made the consumers worse off when you banned zone pricing. The petrol station retailers were the ones who were going to earn more. We found that they earned three times as much profit with the ban. Banning zone pricing raised prices where consumers were getting lower prices, because refiners raised prices to the retailers who had higher margins, foregoing profits on the competitive stations with low margins. The prices charged by retailers at the corners didn't fall because there was no competition at their stations.

**SMITH:** The experiment demonstrated beautifully that the standard intuition was completely wrong. It showed policymakers what they couldn't see from their own perspectives. The implication of the experiments was not to ban zone pricing, but instead to let the refiners do what they were currently doing because it didn't hurt consumers.

**Singapore's Certificate of Entitlement system (for car ownership) and government land sales also go through auctions. Are there other public policy areas where auctions can be used to maximise consumer benefit?**

**STEPHEN RASSENTI:** Bus routes or bus lines can be auctioned to bus companies that are willing to serve the routes. In today's world, you have a perfectly

expressive language in auctions where bidders can come and tell you what they're willing to pay. You don't have to worry that some routes won't get served and try to pre-package them. This need not happen.

In the same way that companies pay to serve a route, they can be paid to serve one. Instead of setting the price at a positive number, you can set it at a negative number and subsidise companies to serve a route. In these auctions, you can let companies express their willingness to buy a whole package of routes that they would be interested in serving and pay you a particular price, because they would clearly be interested in servicing adjacent territories.

**SMITH:** You can run the auction without much information, because the relevant knowledge resides with the companies. For the design of the auction, you have to make sure that the rights, the alternatives and the modes of choice enable companies to express their diverse preferences.

**RASSENTI:** The same is true with respect to spectrum licenses, which have been auctioned all over the world in pre-packaged format. In such auctions, the spectrum bandwidths and regions are always stated, but it is possible to conduct these auctions without pre-stating these. You can let the buyers express how much bandwidth and which regions they need. Many of the buyers don't need what is pre-packaged. Sometimes they need a little bit less; and those that need a little bit more may have to end up buying two licenses, and be stuck with something that is not worth much to him. Why should regulators make those decisions? Why not just let buyers bid for what they need? The environment becomes very complicated, but sometimes a more complicated message space will create more efficient allocation, making it easier for the participants to express their preferences clearly. Otherwise, the regulator may have to be quite strategic or manipulative during the auction process.

Another area of opportunity for auctions is airport landing rights. In the US, airports are required by law to charge landing fees that reflect the costs of building and running the airports. But the Department of Transportation has figured that, under existing law, they can allow the airports more flexibility when pricing, as long as they don't charge more than the overall costs. There are different kinds of auctions that can be used for landing and takeoff rights. It can be a real-time auction where the pilots do the bidding while the airplanes are circling. They can be assisted in their decisions by the

information management systems that they have access to.

Right now, landing rights are still being pre-allocated. There is a prohibition on trading of airport landing rights for cash in the US. The only thing you can do is to exchange something in return for something else. Also, rights are not the only bottleneck. US airports fund airport improvements by selling the gate rights to those airlines that provided the funding for the airport improvements. And so now, for example, even if an airplane can land at an airport, it may not be able to find a gate to dock at, while there are empty gates that only airline partners have access to. So there are opportunities to use auctions to enhance the efficiency of the system.

**How have governments responded to the use of experimental economics in understanding policy problems? Has it influenced their policy design, for example, in the way they structure their markets with their privatisation exercises?**

**SMITH:** You get the most receptive environment when people are facing a genuine problem with their current way of doing things and they are looking for a different way. One good example is the evolution of the market for sulphur and nitrogen dioxide in the Los Angeles Basin. A colleague, David Porter, who is with Chapman University, was involved with its design. They devised a system and allocated rights to pollute. The idea was to tighten the standards and let people trade the permits. But they didn't have any trading mechanism.

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Intermediaries formed and they knew more about both sides of the market than the buyers and sellers. This led to a situation where the market was competitive and disorganised. The intermediaries made huge arbitrage profits buying and reselling the permits. The companies were outraged and they thought that there ought to be a better way to do it.

John Ledyard, Dave Porter, and Mark Olson from Caltech went to the laboratory to create a trading system for these permits. This was a complex market because there were two kinds of pollutants. Some people only traded in one, some in the other and others in both. There is also a distinction between coastal and inland permits because of prevailing winds onshore. If you're located on the coast, you also need to

have permits inland but if you're inland, you don't need coastal permits. So there are constraints. You need to buy enough permits to support your emissions until you get your act together to install cleaner equipment. So basically people buy and sell these permits in blocks. How do you get them to fit together? That's where the combinatorial auctions came in.

In that market, they did a range of laboratory experiments before they actually implemented policies and they had the cooperation of the industry players and the government.

**RASSENTI:** Having a real necessity is an important point. Reforms in the power industry in the United States are slow to come by because people are still well off doing things the inefficient way. In Australia, where Vernon and I went to do consultancies in the 1990s, Australians were complaining that they were paying twice as much for energy as people in the United States. They wanted to renovate their energy industry and the way it was organised to become more competitive. Many in the industry took part in the experiments simulating the new structure before they did something in Australia.

**SMITH:** At that time, each Australian state owned its own generator which generated electricity for its own needs. The National Grid Management Council wanted to create a national electricity market. It was fine if the states wanted to retain ownership of the generators but they had to compete to supply electricity in the national market. So a lot of those assets are still publicly owned but they are disciplined by the market.

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The experiments involved a lot of participants from both sides of the market—buyers, sellers and the national grid. People were asking questions and debating. Back then, it was really a pretty radical idea to trade energy on a network, on high voltage grid in real time. People buying and selling, and disciplined by the constraints on the grid.

The experiments provided a marvellous practical means for overcoming some of the market resistance to this radical new system. It was like having a wind tunnel before implementing policies.

*This discussion was excerpted from an interview conducted by Donald Low, Head*

*of the Centre for Public Economics and Associate Fellow at the Centre for Governance and Leadership, Civil Service College, when Professor Smith and his associates were in Singapore in March 2008, during which they delivered a lecture and conducted a two-day workshop on experimental economics.*

**VERNON L. SMITH** is a Professor of Economics and Law and a research scholar in the Economic Science Institute at Chapman University, California. He has authored and co-authored over 300 articles and books on capital theory, finance, natural resource economics and experimental economics. Cambridge University Press published his *Papers in Experimental Economics* in 1991, and a second collection, *Bargaining and Market Behaviour* in 2000. In 2008, they published *Rationality in Economics: Constructivist and Ecological Forms*. Professor Smith received the Nobel Prize in Economics in 2002 for his work in experimental economics and continues work in the study of market performance, the design of market-based management systems, and in researching the property right foundations of specialisation and exchange.

**STEPHEN RASSENTI** is a Professor of Economics and Mathematics and Director of the Economic Science Institute at Chapman University. His research interests are in economic systems design, experimental economics and organisational design and he has consulted frequently with corporations and governments on the design of auction systems for efficient distribution of public resources such as electric power and communications spectra. Professor Rassenti is currently working on a project that examines a competitive alternative to government controlled drug testing.

**BART WILSON** is a Professor of Economics and Law at Chapman University and the Donald P. Kennedy Endowed Chair in Economics and Law. Prior to this, he was an Associate Professor at George Mason University in the Department of Economics, with affiliation in the School of Law. Professor Wilson's broad fields of specialty are industrial organisation, experimental economics, and econometrics. He is currently pursuing research on the foundations of exchange and specialisation and the origins of property rights systems that support exchange. His other research programmes apply the experimental method to topics in e-commerce, electric power deregulation and antitrust.