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ECONOMICS, MARKET BEHAVIOR, AND THE LAW[†]

Vernon L. Smith[‡]

It is indeed an honor to be the person who is going to inaugurate this wonderful lecture series.

I learned about Cleveland very early in life. Probably, by the time I was six or seven years old, I knew that my father had apprenticed here as a machinist and this is where my father learned the tool making trade. This was the Mecca, this was the center; this is where you came in 1919 or 1920 to learn that trade. On the one hand, my father's influence, without any question, was what started me off in a career in engineering and science. I became interested in economics as an undergraduate and I ended up developing a rather keen interest in studying market performance, having inherited from my father a very strong interest in how things work. He could make anything and he could fix anything. On the other hand, of course, I am an unlikely person to have developed a career in the study of markets. I had to overcome two very significant handicaps. First, my mother was a Socialist and raised me to be one; and second, I have a Harvard education.

I am going to begin with a quotation from David Hume. "Manufacturers gradually shift their places, leaving those countries and provinces which they have already enriched and flying to others wither they are allured by the cheapness of provisions and labor 'till they have enriched these also and are again banished by the same causes." I am going to mostly talk today about two kinds of markets; the first consists of the commodity and service markets, and these are the type of markets that I first started studying in the laboratory, that

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we characterize as recurrent flow, supply and demand markets. I started out with very simple isolated markets for a single commodity, motivating both buyers and sellers, the human subjects in the experiment. Then we moved to more complex, multi-market, equilibrium systems. And this was a tremendous learning experience for me. I had no idea based upon my training that these markets could so quickly discover competitive equilibrium and yield efficient outcomes. Then much later we in the laboratory turned to the study of asset or stock markets, and we found those to be very different animals. So I'll talk a little bit about that. And also, at the end, I want to talk about globalization, but I want to try to relate this laboratory experience with events and understanding about markets in the world that has come to me and other experimentalists.

There are very good reasons to support the belief that exchange has its origin in reciprocity and sharing norms in the family, the extended family, and tribes. This personal exchange, as we have come to call it, allowed for the task specialization in hunting and gathering that laid the basis for enhanced productivity and welfare, which in turn enabled early peoples to migrate all over the world. I think there is a good basis for that argument. The ancient norm of reciprocity and trading favors emerges in two person games in the laboratory between anonymously matched subjects, many of whom used trust and trustworthiness to achieve cooperative outcomes that consciously increase joint benefits. They voluntarily avoid choosing outcomes that take for themselves without giving something in return to their matched counterpart.

Let me give a simple example. Suppose I am matched with you and we are in a room with several other people that are similarly matched. I will never know who I am matched with, and you will never know who you are matched with, so we maintain anonymity. I move first and I have two options: I can opt out and we each get ten dollars and we'll be paid in cash after everybody has finished; or I can pass to you and you have two options. First, you can give me fifteen dollars and you keep twenty-five dollars. (Notice that the original pie has doubled and is now forty dollars.) Or, you can take all of the money and leave me nothing. Those are your two options.

Well, I see the payoffs, you see the payoffs, and game theory assumes people are self-interested in the very, very narrow sense that we always choose dominant strategies. In this case, if I passed to you, I can see that forty dollars is better for you than twenty-five. You will go for the forty dollars, leaving me nothing; so I shouldn't

pass to you. The equilibrium of the game then is for me to opt out and we each get ten bucks.

Well, fifty percent of the thirty pairs of the people in this game passed to the other person. The other fifty percent took the 10 dollars and played it like game theory predicts. Of the half that passed to the second person, three-quarters of them choose the 15-25 split. One-quarter do what we call “defect,” taking the forty dollars.

Now, this is not something you can understand within the framework of traditional game theory. We have varied payoffs across many other experiments, and the results are robust. We have now tested a number of alternative hypotheses and the one that survives as the best explanation is the following: People are coming into the room from a world of social exchange in the sense that they are accustomed to trading favors. “I owe you one,” is a common English phrase. You have that expression in German, Spanish, Italian, and French; evidence indicating that it is both human and universal. What is striking is that this norm is so strong that it survives in the laboratory even though people are anonymously matched. We were trying to create an environment where you had every incentive to defect and the other person could see that you had every incentive to defect and yet we did not get nearly as much of that behavior as game theory predicts.

Of course, I can give you lots of examples of this from the world and you can probably think of more of them than I can. I remember when we moved to the farm. My father lost his job at the Bridgeport Machine Company and we moved to the farm that my parents had bought with the insurance money available from the Santa Fe Railroad (my mother's first husband was a fireman who had been killed in a train accident—very common in those days). That was in 1918 and she married my father in 1921, and this money was invested in the farm. So we moved to the farm hoping that we could subsist there. In the end, we lost the farm to the bank because they shared ownership with us.

I remember very clearly that we could only afford one horse. To harrow you only needed one horse and for pulling the wagon one horse was enough as well. If you were going to plow you really needed two, so we had to borrow a horse. I remember my father returning the horse and offering to help the owner of the horse to install the new windows he had for his house. That is how this rural community worked. People in 1932, in this farming community forty-five miles from Wichita, Kansas, had almost no cash at all. What little cash you had was used to buy things that you could not make, things

that you had to import like a cream separator, or a water pump. You used cash to buy imports from the outside.

Returning to the laboratory, suppose the same subjects who consciously cooperate for their mutual betterment in these elementary two-person interactions come to the laboratory to trade in an impersonal experimental market. By impersonal markets I mean that several people, at least four or five, trade electronically through the rules for some institution that we define for them. What do they do in these markets? They strive to maximize their own gain. But in this process they also maximize the joint benefits to the group although this is not intended. They have no way of knowing what that joint benefit is. The experimentalist knows this and confirms it. These markets are, of course, supported by property right rules that the experimenter enforces; rules that prevent people from taking without giving in return.

In an established commodity and service market, producers incur recurrent, relatively predictable, stable costs. Consumers experience corresponding recurrent flows of value from consumption. But these costs and values are inherently private and the information is dispersed. In the laboratory, we create that same situation by assigning values to the buyers, costs to the sellers. We pay cash to the buyers—the difference between the values we assigned to them privately and the price they pay in the market; thus motivating them to buy low. The sellers are motivated to buy high because they get the difference between the prices at which they sell to the buyers and the private costs we have assigned them.

Command and control economies have failed because this dispersed information cannot be known to anyone. But how do we know that the price-discovery process in commodity markets yields efficient surplus maximizing outcomes? Well, in these controlled experiments involving impersonal exchange, over and over again, in hundreds of replications, we see rapid convergence to the equilibrium outcome. The subjects are not aware of their achievement of the group welfare maximizing ends that they are producing because they do not have all the information it takes to identify the equilibrium or to identify the desirable outcome. In other words, we deliberately create a market where information is private and dispersed and ask how efficient is the information exchange that naturally occurs in the institution that we study. For example, we have studied a great many sealed bid-offer auctions. In repeat interaction, how effective are people able to achieve these welfare maximizing outcomes? The answer: they are highly effective.

It is very clear that they are unaware of what they have done. For example, if you are doing these experiments as a teaching exercise you have the opportunity to ask people questions about how they perceive it. After an experiment, people will deny that any kind of a model is able to predict their price outcomes. But before the experiment begins, you make sure that someone in the class gets a sealed envelope with the equilibrium price and quantity. Then, have her open it afterward. Written there is the predicted outcome.

They also believe that, as individuals, it ought to have been possible for them each to do better than they did. They will always report, "Oh, yes, it truly would be possible for the individual to do better," but actually that is not true by definition of equilibrium. Each is doing the best he or she can do given the behavior of everyone else.

These are just some examples showing that people make markets work—they do not have to know any economics, they do not have to know anything about supply and demand, they do not need to know any mathematics. In a multiple market experiment, the most that buyers are willing to pay for A depends on the price of B and vice versa, and you set this up with simultaneous non-linear equations to solve for the equilibrium. It takes a few periods longer than for a single commodity market but it converges to the equilibrium. The buyers have no idea how to solve those non-linear equations. They do not even know what they have done. Ladies and gentlemen, this was an eye-opener for me and a lot has happened since these early experiments that I did about 50 years ago.

Now, let me ask what we have learned about markets in the world and how this experimental research applies. I think it is clear that commodity and service markets are the foundation of existing wealth creation. This is a basic principle, of course, but we actually see it demonstrated in the experiments.

Each of us earns our income from only one or two sources while then using and consuming hundreds and hundreds of items throughout the day that are produced by others whom we do not know and never will know. The hallmark of commodity and service markets is diversity; diversity of tastes and skills, knowledge, natural resources, soil, and climate. This diversity accounts for the differences in the values and costs that we use to define and motivate gain from exchange in the laboratory. So we create an environment which reflects that kind of diversity. And, as I have said, I believe that it is reasonable to argue that this diversity was encouraged initially through the sharing and the reciprocity norms within the family.

Ethnologists have been studying extant hunting and gathering societies for over 100 years, and it has become clear that these stateless hunter-gatherers societies were highly specialized. The women and children gathered fruits, nuts, tubers, grains. The men hunted. The old men, no longer able to stand the rigors of the hunt, advised in the hunt and made tools and weapons, and rejoined some of the gathering activities. We have observed in these economies with no money and no barter that sharing customs nonetheless constitute an exchange system that allows a limited amount of specialization to occur and create wealth.

Now at many times and places in prehistory, this kind of exchange system was extended to strangers who bartered, and ultimately led to the use of commodity money. Indeed, early humans set the stage for a vast expansion of wealth and well being whenever they discovered that it was better to trade with their neighboring tribes than to kill them. If you kill them they cannot produce something and trade with you tomorrow, nor can you benefit from their unique skills in learning, art, culture and experience. Similarly, if you let them live and then steal from them, they are much less willing to produce for you tomorrow than if you trade with them today.

Diversity requires freedom because it is freedom that allows each to be as different as he or she is able and desires to become. Markets in turn support tolerance of freedom. Chile, for example, had little political freedom but opened the economy to freer choice and this freedom spread to political choice and brought democracy. Likewise, I think that there is a good chance that this will happen in China, where the central government recently moved to legalize property ownership largely because of corruption. In fact, people in China already do own property; it is recognized and traded in the community. Since the property owners lack a government recognized title, however, it is tempting for bureaucrats to extract payments from the property owners. Well, the central government is concerned about that because, after all, what China has learned is that this greater economic freedom has enormously improved productivity and betterment in China. Anyway, we will see how and to what extent this greater freedom spreads to the political sphere.

We have need of others and the diversity that they bring to the table if we are to rise above bare subsistence. Through markets we depend upon others whom we do not know, recognize, or understand. We know not how and in what way others contribute to our welfare, nor how we contribute to theirs. Such are the long, subtle chains of interdependence through markets connected by prices.

The welfare of each of us, as individuals, depends vitally upon the knowledge and skills of others with whom we trade through markets, for without markets we would, indeed, be the poor, the miserable, and the brutish. If some were less poor it would be because of conquest or theft, taking without giving in return which can be sustained only for as long as there is someone to conquer.

Markets require consensual enforcement of the rules for social and economic exchange. No one said it better than David Hume over 250 years ago when he said that there are just three laws of human nature: First, the right of possession; second, transference by consent; and third, the performance of promises. These are the ultimate foundations of order, with or without formal law, that make markets and prosperity possible. Notice that we are seeing the same principles emerging in China and creating problems because they are colliding with the former law. We are seeing changes in the former law to accommodate the social norms.

It is important to make the distinction between what Hayek calls “found law” and “made law.” He points out that the early law givers did not *make* law, rather they discovered it in social practices, and then announced it. That is what David Hume was doing. And you have perhaps noticed that Hume's laws of nature are derived from the ancient Judeo-Christian commandments: thou shalt not steal; thou shalt not covet thy neighbor's possessions; thou shalt not bear false witness. But these same commandments are urged in other cultural groups and religions all over the world. The game of steal consumes wealth without encouraging its reproduction, while the game of trade sustains and grows abundance. Coveting the possessions of others invites an involuntary state-enforced redistribution of the gains from specialization and trade, endangering incentives to produce tomorrow's harvest, possibly as surely as its theft. And, of course, bearing false witness undermines community, management credibility, investor trust and confidence, long-term profitability and the personal social exchanges that are most humanizing. We have seen what the stock market does to a company and its management and its stockholders as soon as that management loses its credibility with investors. Enron, for example, went right down the tubes and fast.

I want to turn now to stock markets but before I do that, let me just say a little bit about what has happened since the early work in experimental markets. An awful lot of the day-to-day work that my colleagues and I do has been concerned with using the laboratory as a test bed to study the performance of new markets where they have

never been applied before, and people are not sure if it is possible to extend markets to these new applications.

For example, in the electric power industry in Australia, it was the buyers who wanted to restructure the industry. It was representatives of the buy-side of the market, particularly industrial and commercial users of power, who thought that the government-owned power system was too costly. They felt they were paying far more than they should have to pay for power. These users of power have to compete in world markets, and in Australia there are a lot of energy intensive products made for export. So if a major input like power is more expensive than it needed to be then that creates problems for them. That ultimately led to substantial liberalization of that industry in Australia, as well as in New Zealand.

The Australians developed the software for trading energy, and we served as consultants in their experiments. They wanted to go through the exercise themselves, to design and conduct experiments before they moved their market designs into the field, and that learning was enormously important in demonstrating to them that it was feasible and that it can be done. Of course, in the experiments they were trading energy on a grid that represented their parameters in Australia, so it is just the same as it was going to be when they started trading power in the economy. They used subjects whose profits were paid to them in cash. They did fairly long experiments, seven hours a day for two weeks, and developed a professional group of traders. Without going into a lot of other examples, suffice it to say that this illustrates where we are now in the study of commodity and service markets.

Now, let me turn to the laboratory stock markets. Most interesting is that even in these markets where fundamental values are well-defined, inexperienced subjects do not trade stocks at their fundamental value. They produce big bubbles and crashes. Bring them back a second time and we will see another boom and crash, although without as much volume. Bring them back a third time, and finally they start to trade around the fundamental value. It is an experiential process whereby they come to accept that this thing called a holding value, or the dividend value of a share, is something they had better pay attention to. They don't get there by logic, or by thinking about it. They get there through an experiential process. So, the behavior in the laboratory with regard to these stock markets is very erratic compared to the recurrent flow markets for goods.

Of course, we see what appear to be big bubbles out there in the world. These are not new; there is nothing new about bubbles and

crashes. They are basically fueled by new technologies. If you go, for example, back to the 19th-century, the steam engine allowed the steamship to replace the square rigger and the steam locomotive to replace the mule team and stage coach. This fueled a huge expansion in the American railroad industry. The expansion outran the shipping needs of inter-regional trade, profitability turned to losses, bankruptcies, consolidations, but out of that came huge, long-term values, created and retained for the entire economy.

At the turn of the 20th-century you have all of these innovations, the telephone, electricity, and petroleum, taking off with the development of the automobile and sustaining investment and economic development. And that development involved over-expansion. In the rush to enter into the electric power industry, cities were giving franchises for electric companies and telephone companies to all who would apply. So, as is common with a new product, i.e. for new products that have a strong appeal, it starts out in very high demand. With a high demand, prices are high and you have a rush of entry by new firms because it is so profitable. Then there is a shake out and bankruptcies, consolidations and that sort of adjustment afterward.

The difference in electric power was that you had the introduction of regulation. In a 1915 collection of public speeches, Sam Insull argued for rate of return regulation to create profit stability in the electric industry. He wanted guarantees that all would get a fair return on their investment. This move to regulate industry was coming from the industry not consumers, and a very strong force behind that was Sam Insull, the leading executive in the industry.

I grew up in Wichita, Kansas and in 1929 there were 15 manufacturers of light planes: Lark, Lear, Swift, Travelair, and so on. Two new companies had made their entry in 1927, Cessna and Stearman. The name of Walter Beach was not known yet, at least in management. He was a test pilot and was involved in some of the existing companies. Interestingly, a decade later, out of the 15 upstart companies, Stearman, Cessna and Beach emerged and made Wichita an international aviation center.

Walter Beach died in the 1940s. His wife, Olive Ann Beach, took over the company and she was actually one of the great woman executives in this country. She was president of the first corporation headed by a woman to be listed on the New York Stock Exchange. That was Beach Aircraft. My point is that there were lots and lots of contenders for survival in that industry. After the stock market crash in 1929, Clyde Cessna, Walter Beach and Lloyd Stearman bought up

the assets of those companies, consolidated them and went on to create a major worldwide industry.

So picking winners and identifying losers is inherently risky and difficult, if not impossible. We have seen, here, in the decade of the 1990s, an unprecedented number of new IPOs come to market. People were experimenting with managing a host of new technologies. And it is not an accident that we now find ourselves, as the economy comes back, growing very rapidly. We are getting more output with less labor. That is a long-term trend in manufacturing. I think it is almost certainly going to go the way of agriculture, that is, more and more output with less labor.

New innovations add to productivity. It is not clear to me how you can avoid the individual pain of losses and also get the long-term value that comes out of these stock market bubbles. We just do not know what kind of a policy fix would work that would avoid the risk of doing more harm than good. Here is the problem: if you limit people's decisions to make risky investments and attempt to keep them from harming themselves, how much will that reduce our capacity to achieve technological advancement? The hope of great individual gain fuels thousands of experiments in an environment of great uncertainty as to which experiment will be successful and what combination of management and new technology will actually work. After a big wave of innovation and the bubble bursts you have managers that have learned a lot about what does not work and even a little bit about what does work. And I think that process is very necessary. Certainly if I knew how to get the benefit without incurring a cost, I would be rich overnight. I could endow lots of lectures and buildings everywhere. It would be very easy. But of course, we do not know how to do that and if someone tells you they do, keep your hands in your pockets.

To say a few words about globalization, I see globalization as having begun at least 40-50,000 years ago. Some time around then, as far as we can tell from the best evidence that we now have, the ancestors of all of us walked out of Africa. These were the Cro-Magnon peoples. One branch of these people made it to Australia by 40,000 years ago. By 11-12,000 years ago a branch of this original family had settled in North and South America. They spread throughout the world. The final settlements came in New Zealand and Madagascar, which were only settled about 1000 years ago. So, long before the square rigger sailing ship our ancestors had settled every continent except Antarctica and all the major islands. The ethnographic and archeological records suggest that people traded very early, long be-

fore nation-states. Ethnographic studies show that people traded goods and weapons, but also public goods like symbols, customs, crests, and unmolested rights of access to trading routes. They would reach agreements on the exchange of these public goods, and this paved the way for individual rights to trade.

To summarize briefly, commodity and service markets are the foundation of existing wealth creation. Stock markets serve by supplying capital for new products and this explains why they are inherently uncertain, unpredictable, and volatile, tending to bubble and crash. Stock markets are far more uncertain than markets for commodities and services because stock markets must anticipate innovations in commodities and services of the future. Finally, globalization is not new. It is the modern word describing an ancient human movement, a word for mankind's search for betterment and the worldwide expansion of resource specialization which is determined by the extent of market development. I think globalization is a good word. Some people disagree. But I think it is a good word, a peaceful word. As the great French economist, Frederic Bastiat, wisely pronounced, "If goods don't cross borders, soldiers will."

Thank you.

