3. GENERAL EQUILIBRIUM AND MULTIPLE MARKET SYSTEMS

Market interdependence is pervasive through all economies and it has attracted interest since the beginning of economics. Throughout history theories about the nature and consequences of interdependence have been the foundation of powerful and conflicting philosophies. The modern theory of general equilibrium that emerged from a century-long controversy holds that economies can be understood as a large system of simultaneous equilibrium equations. And, while the theory itself is highly technical, it holds profound implications about the role played by specialization and the law of comparative advantage in the creation of wealth. Almost all textbooks claim that self interest in response to profits promotes wealth-creating specialization and that prices serve as a key coordinating vehicle as described by the system of equilibrium equations. Yet, in spite of the importance and precision of the body of theory, skeptics remain and the reason they remain is obvious: the complexity of any economic system found in the field can always be used to produce a plethora of alternative theories that are impossible to discredit. Those who want to find an alternative theory to explain a pattern of facts can easily do so.

One does not need to look to the hotly debated political philosophies to find a need for a demonstration of the theory under controlled experimental conditions. Alternative theories are appearing as game theory advances. The alternative might be that the allocations are better described as the solution to a game as opposed to a general competitive equilibrium. In modern discussions that are heavily micro economic in nature, the possible influence of the background system of general equilibrium equations becomes lost. When interdependence is brought into the theory, data from multiple markets can be used to suggest a general pattern of randomness that seems to have no relationship to an underlying system of equations that might characterize equilibrium. The need for experiments stems from the fact that nature does not cooperate to create field circumstances that allow one to determine which theory from among many competing theories is the most accurate. Thus, the papers in this section are particularly important as demonstrations of the power of the theory and the underlying principles that are at work.

The need for experiments is so obvious that one wonders why they were not conducted many decades ago. The reason is easily discovered. Experiments with multiple markets and multiple agents with complex tasks like production were simply not possible. Two developments opened the possibilities, both of which are related to the development of the Internet and powerful local computers. The first was the development of electronic market systems that were capable of supporting multiple markets and large numbers of agents. Experiments with general equilibrium require a number of

participants that far exceeds the capacity of early experimental methods and technology. The second was the development of experimental procedures and management tools that permitted subject recruitment, instruction and control together with the monitoring and instantaneous communication with remotely located subjects. The development of those laboratory experimental economics tools opened the door for a study of phenomena that had previously been impossible.

The papers in this section demonstrate the amazing fact that multiple markets have many of the properties found in classical writings in the field of general equilibrium. The first paper reviews applications in which the complexity of competing production technologies exists along with the interdependence caused by the operations of derived demand for inputs. The fundamental conclusion is that the law of comparative advantage can be observed operating in spite of such complexities. Specialization according to comparative advantage finds its way into most aspects of economics. Of course that is not surprising to an economic theorist because such specialization is fundamental to the wealth creating capacities of economic activity. The phenomenon is easy to see and understand in the context of a partial equilibrium model where it appears in models of industry entry with the most efficient firms (from a social point of view) being the first to enter. It appears again in exchanges where the resulting specialization in consumption can be viewed as an instance of the law of comparative advantage. However, in general equilibrium and especially in international trade context, the phenomena depend on sequences of interdependent patterns of specialization and thus become subtle. The first paper demonstrates how to study such complex issues and that the intuitions derived from the fundamental theories survive the tests.

The second paper explores the application of theory to the case in which risk must be allocated among those willing to bear it. The close relationship between modern finance and the theory of general equilibrium is often overlooked. Indeed, the study of asset markets has lead many to deny this relationship. However, experiments have indicated that the modern theory of finance and general equilibrium are closely related and this relationship can be directly observed in experimental markets.

The third paper extends the analysis to interdependencies that exist in networks of markets typical of location or vertical integration. Basic resource suppliers are located at the beginning of the chain and final product demanders are at the end of the chain and these are connected by a long sequence of intermediate (or transportation) links, each of which has its own separate market. The issue is whether and how the decentralized markets can coordinate the system. The result is a convergence toward the competitive equilibrium along a special path that starts with low prices at the "source" and high prices at the "sink" with the movement near equilibrium being a "lump" rather than an even flow.

Most general equilibrium theory is just that – a theory of equilibrium as opposed to a theory of what might happen in disequilibrium. Indeed, the modern dynamic models frequently have no disequilibrium at all but instead, the movement itself is assumed to be an equilibrium path. By contrast, the first three papers all demonstrate the capacity of markets to move toward the general equilibrium, but it is the movement itself, the

disequilibrium as opposed to the equilibrium, that is prominent in the data. The final paper of the section outlines experiments designed to study disequilibrium in a general equilibrium setting. The findings are stunning in the sense that the classical theories of general equilibrium dynamics are found to produce models that capture many of the properties of the data even under conditions in which one might think that the theory would not apply. The message is that economic equilibrium must be understood in terms of events that take place when markets are in disequilibrium and major insights about how those event influence price discovery are contained in the classical models of multiple market dynamics.