Chapter 4

Afterthoughts

When Adam Smith wrote about the working of the invisible hand, how it led self-interested individuals to act in a way that furthered the efficient allocation of resources, he had in mind an economy that was already decentralized and complex. In this economy, each individual was a small part and had little knowledge of the whole. These individuals pursued their own narrow interests with little thought for the rest of the complex process that constituted the life of the economy. That order could come from the uncoordinated decisions of these agents is still an amazing insight.

The theory of competitive general equilibrium that culminated in the the Arrow-Debreu-McKenzie (ADM) model is a beautiful formalization of Smith's insight. It remains the best rationalization we have of the viability of the market system. It also provides an analytical model that is still the workhorse of many areas of economics. But in spite of its subtlety and power, the ADM model hardly does justice to the richness of Smith's vision. The decision-making framework represented by the ADM model, which we take to be the paradigm of perfect competition, reduces the whole economy to a single auction market. Although the ADM can be interpreted as a theory of general equilibrium in a complete economy, it does not take seriously the distinction between partial and general equilibrium. It allows for any number of commodities, even an infinite number, and this is often interpreted as meaning that there is a large number of markets. It would be more accurate to say that there is a single market in which any number of commodities can be simultaneously traded. In any case, the qualitative properties of the model are essentially the same regardless of the number of commodities/markets, so this is not a theory in which the number of markets matters much.

It was suggested at the end of the last chapter that the models we have been discussing, like the ADM model, do not take seriously the distinction between partial and general equilibrium. There are many ways in which these models could be made more realistic. Two I want to emphasize are incompleteness of markets and incomplete participation in markets.

It has long been recognized that markets are incomplete. The ADM model distinguishes commodities by physical characteristics, time and place of delivery, and the state of nature on which delivery is contingent, and then assumes that a market exists at the beginning of time in which all these commodities can be traded. Clearly, it is literally impossible to trade all of these commodities at a single place and at a single point in time and in that sense markets are "incomplete". Models of general equilibrium with incomplete markets (GEI) have been developed to deal with the intertemporal issues that arise when it is impossible to trade all commodities simultaneously. Since every commodity can be traded at some point in time, trade has to continue through time. Incompleteness of this kind is important because it restricts agents' ability to share risks and smooth consumption and production flows efficiently.

There are special conditions under which markets that are not literally complete, as in the ADM model, are nonetheless effectively complete because they allow an efficient allocation of resources to be achieved through dynamic trading of a small set of commodities and securities. This is an important extension of the classical theory and one that has found extremely important applications in finance, but the more interesting possibilities from the point of view of understanding the economic coordination problem arise when markets are effectively incomplete and the resulting allocation of resources is not necessarily efficient.

Another kind of incompleteness takes the form of incomplete participation. In the classical theory, even with incomplete markets, every agent participates in all the markets that exist at any point in time. As a result, a large part of the coordination function that Smith ascribed to the invisible hand is here rendered more or less automatic by the assumption that all agents are interacting in all active markets at the same time. A more realistic and more challenging vision would recognize that most economic agents do not trade most goods and do not therefore participate in most markets. Furthermore, if we look only at the restricted set of markets that an individual agent does participate in, we would see that he is not active in all of those markets simultaneously. These observations have important

consequences for the operation of markets.

There are special conditions under which markets with incomplete participation will behave like markets with complete participation, just as there are conditions under which incomplete markets will perform like complete markets. For example, middlemen and arbitrageurs can eliminate gains from trade between different markets and ensure an efficient allocation of resources in the absence of complete participation. But these conditions are restrictive and in any case that is not the most interesting use of this theory. The more interesting possibility is to see under what conditions we get different results.

Extending the theory to take account of these two kinds of incompleteness will not be easy. Allowing for incomplete markets will not be easy because it requires one to introduce time in a very different way. In the preceding chapters, time has been used as an opportunity for trading to reach an efficient allocation in a stationary environment or it has been used as an opportunity for learning about or adapting to a stationary environment. We start with an essentially static model and study how the equilibrium of the static model is achieved as the outcome of a pseudo-dynamic process. Models with incomplete markets are dynamic. They presuppose time in which things happen and the world changes. Mixing up these two uses of time is not likely to be easy.

Allowing for incomplete participation raises different problems. First, there is no well developed counterpart to Walrasian equilibrium theory with incomplete participation, although there are some intriguing examples. Secondly, it is not clear what the relevant questions are. One suggestion is that incomplete participation has something to do with bounded rationality. One way that the economy responds to the complexity of the world is through the division of labor. Individuals specialize in different markets. In principle, this may lead to the same outcome as a model with complete participation. Roughly speaking, if arbitrageurs and middlemen ensure that all the local first-order conditions are satisfied, this may result in a global optimum (efficiency). But that outcome seems optimistic if the agents specialize in the first place because of bounded rationality. How do we know that agents operating in different markets will make the right decisions? Doesn't it require too much common knowledge, too much rationality in their expectations? That really is the question and just as the ADM model does not explain how we get to equilibrium or under what circumstances the Walrasian definition of equilibrium is appropriate, so it seems that modeling the coordination of markets as if they were a single market does not quite do the trick either.

But that is another story and far beyond the scope of these lectures.