John Roberts on Hugo F. Sonnenschein

One of Hugo's most lasting lessons for me was the crucial importance when doing theory of getting the foundations straight and strong. The paper that follows, "An Equilibrium Model with Involuntary Unemployment at Flexible, Competitive Prices and Wages" (Roberts 1987b), is an attempt to be careful about foundations in the context of a model of a whole economy. It grew out of work that Hugo and I had done a decade earlier.

In the mid-1970s Hugo and I looked at the then-burgeoning literature that was trying to bring elements of imperfect competition into the Arrow-Debreu model. That model's foundations were secure in that all the relevant properties of its constructs were obtained from assumptions on the fundamental elements of the model. Thus, for example, the continuity of excess demand that underlay the application of Brouwer's theorem to establish existence of equilibrium was derived from assumptions on tastes, endowments, technology, maximizing behavior and the structure of markets. The same was not true however, of the imperfectly competitive general equilibrium models. Most of these papers simply assumed that the imperfect competitors' behavior could be described by continuous reaction functions or convex-valued UHC correspondences. But there was no analysis of what conditions would generate this continuity. So Hugo and I set out to try to find out what assumptions on fundamentals would generate these properties.

What we found was not good for the existing theory (Roberts and Sonnenschein, 1977). Drawing on work initiated by Hugo on what functions could be excess demand functions (Sonnenschein 1973), we easily showed that, in essence, there were no assumptions on the fundamentals that would do the trick. You could not get the foundations right simply by tacking some agents who perceived that they influenced price formation onto the standard Arrow-Debreu model.

In the following years I learned game theory and especially the use of the extensive form. I came thereby to appreciate the importance of specifying carefully and completely the range and timing of actions and the outcomes corresponding to any available set of choices. This of course had not been done in general equilibrium theory, whether with imperfect competitors or not. There was no modeling of the process of price determination, no specification of what would happen if markets did not clear, and no indication of how the actual transactions would be carried out even if prices would support market clearing. Yet our partial equilibrium models indicated these sorts of specifications could be very important.
Thus I began by constructing a simple example of an economy where the owners of the production technologies ("firms") set prices and wages, worker-consumers placed orders and offers and the firms decided how much of these to accept (Roberts, 1987a). The set-up was a fully specified extensive form game (including utility functions), and it was reasonably straightforward to compute the subgame perfect Nash equilibrium. This was then truly an imperfectly competitive general equilibrium, and it had some interesting properties. For instance, while the ratio of the output price to the wage announced by any firm was higher than in the Walrasian solution, the prices were actually lower relative to the numeraire than the Walrasian ones. To me this seems to indicate that we really do need to take the analysis of imperfect competition into a general equilibrium context.

Working with the example while varying the institutional arrangements in the model led me to see that it might be possible to have rationing in equilibrium, where of course equilibrium means that no one has any unilateral incentive to change any of his or her choices, whether these be prices, wages, offers to trade or decisions whether to accept offers. This opened the possibility of generating Keynesian involuntary unemployment as an equilibrium phenomenon, something that could never be done in models in the Arrow-Debreu tradition, where equilibrium means market clearing.

The following paper realizes this possibility. It has equilibria with Keynesian unemployment at Walrasian prices and wages, and because the processes of price formation and trade determination are modeled, equilibrium means that no one has an incentive to change prices, wages or offers to trade. Hugo’s lesson proved very important: If you get the foundations right, then you can do things that are otherwise impossible.


