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# Inaugural Speech

Richard Goodwin

It gives me great pleasure to open this conference and welcome you all to the delightful surroundings of the Certosa di Pontignano. I have always found it a most attractive place for working, for making contacts with others, for relaxation. Before joining the Faculty of Siena, I had often stayed here briefly for giving lectures or a seminar. I had found it such an attractive place to be that I looked forward to living in the Certosa, but that, alas, could not be.

We are here to discuss a traditional conception which remains important, and with remaining unsolved issues. I feel happy to say a few words of introduction, since it gives me a chance to have my say first! The timing of the conference could not have been better chosen, since it assumes a peculiar relevance and significance at a time when there has been a final and dramatic rejection of central, bureaucratic planning of the economy in favour of competitive, price-market control.

From Adam Smith through the Classical economists to Walras, the theory and analysis of auto-control by market adjustment mechanisms has occupied a central place in our discipline. Walras really stated the problem in all its complexity and, in a sense, has dominated analysis ever since. As far as I understand it, he wanted to prove the existence and uniqueness of general equilibrium: he did this by a constructive proof, which was judged good, but not good enough. Since he used a sequential or iterative procedure he sometimes seems to imply dynamical analysis. Schumpeter as a young man in pursuit of better dynamic processes, visited him in search of fruitful ideas, but reported that he found no serious interest in dynamics, a view with which I agree, but I believe Professor Morishima disagrees.

Both he and I have independently found the Walrasian approach suggestive and useful in gaining insight into convergence to equilibrium positions. We have tried to consider the difference between demand and output as leading to an equilibrium fixed point: likewise the difference between price and cost as bringing them into equality. And, of course, in

the long shadow of Keynes, one has to consider the impact of output on both demand and price as well as the effects of cost and price on output.

The analysis of these dynamical trajectories in the context of the vast number of markets and agents and agents presents awesome difficulties. To keep matters as simple as possible, it is helpful to use the linear assumption that reactions to differences between supply and demand or price and cost, are proportional to the size of the differences, (This was, I believe, the aim of Walras). To reduce the complexity of the analysis, I tried using poential theory as determinant of the vector fields of trajectories. I found it helpful to determine the eigenvalues of the system and the eigenvectors of output and of price. Proceeding in this way, I found that for an economy with a net product, the real parts of all eigenvalues would be negative, and hence a given system would be unambiguously stable asymptotically to its fixed points. For a more complicated system, however, Professors Flaschel and Semmler have produced more than one unstable counterexample. Professor Boggio has also found a solution not in agreement with mine and therefore finds my method lacking in mathematical rigour (to which I readily confess), and potentially misleading (which I plainly did not intend). So now that I have had the pleasure of the first word, I leave to them, if they choose, the pleasures of the last word!

It is worth noting that systems theory provides at least two other elementary types of control — derivative and integral. Thus not only the level of price, but also its rate and direction of change, may matter; and perhaps even more so for demand and output. Thus, given the stochastic nature of economic variables, producers may relate output more to the level of stocks than of demand. Or central banks presumably pay more attention to their stock of foreign exchange than to the day to day gyrations of the market.

I found it interesting to arrive at a stable dynamic conclusion, since it means the desires of all economists are satisfied: no matter how often disturbed, the economy was always at or near equilibrium and always approaching it. This gave the happy reassurance that one could give full scope to the analysis of productive structure and equilibrium values and outputs, to the exclusion of endogenous turbulence. For myself I think the economy tends to be unstable locally around equilibrium and only stable globally.

With that reassuring reflection, I declare the Conference open.