ON THE FOUNDATIONS OF
STOCHASTIC NON-PRICE RATIONING
AND THE ADJUSTMENT OF PRICES (*)

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The paper presents a general model of an economy with price stickiness. The model is structurally equivalent to a generalized game. Strategies are vectors of transaction offers and the list of all agents' transaction offers determines agents' strategy sets, by means of quantity signals. An equilibrium in this game is an equilibrium with quantity rationing. If the quantity signals consist of the aggregate values of demands and supplies, then compatible rationing mechanisms must be manipulable and stochastic.

The study of price adjustment between successive plays of the game calls for a measure of the size of disequilibrium in an equilibrium. Since under stochastic rationing equilibrium transaction offers differ from actual trades, the ratios of aggregate demands and supplies provide such a measure. In order that it be reliable in spite of agents' incentives to manipulate, their preference structures must meet a (weak) condition.

1. Introduction

This paper aims to contribute to an adequate modelling of the functioning of economies in the presence of price rigidities. The latter phenomenon, i.e. the temporary persistence of prices at which supply and demand are not equal, has been frequently observed and plays a crucial role in a large class of macroeconomic models. Theoretical rationales for price rigidities are available by now and will be briefly presented below.

In a recent paper, Carlton (1986) provides evidence on the amount of price rigidity that exists in individual transaction prices. Carlton finds that, for many transactions, prices remain rigid for periods exceeding one year. He concludes that «Nonprice rationing is not a fiction, it is a reality of business and may be the efficient response to...»

(*) This paper builds upon notes [Weinrich (1984c), (1984d)] written at C.O.R.E., Louvain-La-Neuve, Belgium, while I was a Research Fellow there. I am grateful to Volker Böhm and the participants of the micro seminar at VPI & SU for helpful discussions and suggestions.
economic uncertainty and the cost of using the price system (1). Moreover, "... the empirical results are sufficiently startling that we should reexamine the central, often exclusive, role assigned to the price mechanism in theories of efficient resource allocation. It is not necessarily that the price mechanism has failed, but rather that alternative allocation mechanisms are used in addition to the price mechanism to achieve efficiency." (2)

The most important reasons for temporary wage and price rigidities may be summarized as follows. "Wages are set for long periods because collective bargaining, threats of strikes, or simply careful review of worker performance make adjusting the wage costly. ... Prices are set according to a stable markup over costs. ... Firms use markup pricing because of information limitations, customer relations, simple rules of thumb, and oligopolistic strategy" (3).

That prices and wages are temporarily rigid clearly does not mean that they do not give way under market pressures. Instead it is true that prices and wages eventually adjust and play their well-known role in efficiently allocating goods. However, this transition period may be so prolonged that economic agents are sufficiently affected in their opportunities to warrant economic research and modelling of this phenomenon. The recurrent occurrence of high unemployment persistent over years is only a foremost among many examples.

These remarks call for a careful modelling of trading under non-market clearing prices and the adjustment of prices as time passes. One possibility to do this is as follows. Time is divided into an infinite number of periods. "At the outset of each period, prices are quoted and cannot change during the period. At these prices, supplies and demands expressed ex ante by the agents may be incompatible. In such a case, the ex post equilibrium at that date is achieved by quantity rationing. Once such an equilibrium is established, transactions take place, and prices may be revised at the beginning of the next period by the agents who control them in view of the information generated by the exchanges of the current period". (4) In this way a sequence of prices and associated allocations is formed, the properties of which can be studied (5).

A formalization of this approach involves the specification of two mappings. The first is to associate with any given vector of prices a feasible and consistent allocation. The second mapping has to take care of the adjustment of prices, i.e., to designate a price system $p_{t+1}$ for period $t + 1$ based on variables available at the beginning of period $t + 1$ (or equivalently, at the end of period $t$).

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(5) A simple but very insightful macroeconomic model along these lines can already be found in Hall and Taylor's (1986) intermediate macro textbook.